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ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 1991

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

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ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 1991

MONDAY, MARCH 19, 1990.

FEDERAL ENERGY REGULATORY COMMISSION

WITNESS

WILLIAM S. SCHERMAN, GENERAL COUNSEL, FEDERAL ENERGY REGULATORY COMMISSION

Mr. FAZIO. We will convene the hearing today of the Energy and Water Subcommittee to take up the budget of the Federal Energy Regulatory Commission.

We would like to welcome Mr. William Scherman, the General Counsel of the Commission, to the committee to testify in lieu of Chairman Allday.

We are regrettably without our chairman, Mr. Bevill, as well, so the two of us, with Mr. Myers' good help, will have to do the best we can in our capacity as back-ups today.

I would ask you to place your full comments in the record and go ahead with your presentation.

Mr. SCHERMAN. Thank you, Mr. Chairman. I appreciate that.

I am Bill Scherman, General Counsel of the FERC.

I am here today to present the Commission's fiscal year 1991 budget request on behalf of Chairman Allday who is unable to appear because of surgery last week.

As you know, Chairman Allday has been on the job for fewer than four months.

Therefore, I would like to outline what his overall objectives will be during his tenure as FERC Chairman.

As a general operating principle, Chairman Allday will be looking for additional ways to allow competition to operate in the industries FERC regulates.

Chairman Allday believes that, where appropriate, competitive markets are the surest and quickest way to achieve the appropriate balance between supply and demand, risk and reward.

While competition may not be sufficient in all situations, we will allow markets to operate where sufficient competition exists and take appropriate steps to foster competition in those markets where sufficient competition is not present.

At the same time, one of Chairman Allday's top priorities is to strengthen the legal underpinning of the Commission's orders and opinions.

By reinforcing the legal foundation of our decisions and orders, we intend to provide some much needed stability for the industries we regulate. Chairman Allday is committed to turning out a first-rate legal product.

As General Counsel, I will do all that I can to ensure that this commitment is put into practice.

We will strive to ensure that the Commission's orders comport with our statutory mandate to protect the public interest, and that they are well-reasoned and within the scope of the Commission's delegated authority.

Because investment decisions may hinge on the Commission's decisions, Chairman Allday seeks to establish the kind of stability you can take to the bank.

This means that everyone—industry, Government, and the consumer—needs to know what is expected of them.

I don't suggest that this is an easy task, but it is one that is important to all of us, and Chairman Allday intends to make this an important feature of his agenda.

Turning now to the specifics of our fiscal year 1991 budget, the Commission is requesting $122.75 million and 1,570 full-time equivalent staff years for the fiscal year beginning on October 1, 1990.

Of this total, we are requesting $57.3 million for natural gas regulation, $35.8 million for hydropower regulation, $26.5 million for electric power regulation, and $3.2 million for regulation of oil pipelines.

This budget represents an increase of approximately $7.8 million over the Commission's fiscal year 1990 appropriation, taking into account the $1.6 million sequestration pursuant to Gramm-Rudman.

The Commission's fiscal year 1991 budget request involves no new programs or staffing increases.

Let me highlight briefly what composes the increases. It is essentially in four areas.

One is the 1991 effect of the January 1990 pay raise and related costs totaling $2.6 million; an additional $3.1 million to support growth in environmental work associated with the timely processing of hydropower licensing matters and applications for certificates for new pipeline capacity; an increase of $1.3 million for improved automation of workload processing activities; and another $0.8 million to cover remaining fixed cost increases to basic program support services such as space rental, telecommunications, and printing.

The Commission's budget request includes $8.7 million to support our environmental workload in fiscal year 1991.

$4.6 million of this amount will be used for environmental activities related to the natural gas pipeline certification process.

The Commission is continuing to give priority to processing applications to serve new markets and develop new capacity—particularly in the Northeast, Pacific Northwest, California, and Mobile Bay area offshore Alabama.

The requested funding will enable us to undertake the major environmental reviews required in association with such new pipelines.

The remaining $4.1 million of the $8.7 million environmental budget will be used to address the hydropower program's environmental review requirements.

I want to emphasize today that funding for FERC activities will be completely offset by revenues generated from Commission fees and annual charges.

The Commission is required by law to assess and collect fees and annual charges in amounts sufficient to recover all of the costs incurred by the Commission.

The revenue generated from these fees and charges is used to offset the Commission's annual appropriations so as to result in a net cost to the Treasury of zero dollars.

In conclusion, Mr. Chairman, on behalf of Chairman Allday, I want to assure this subcommittee that the Commission is committed to regulating the industries under its jurisdiction in a fiscally sound and environmentally responsible manner.

We will continue to strive to promote competitive markets, wherever possible, as the surest and quickest way to achieve the appropriate balance between supply and demand, risk and reward.

Chairman Allday believes that the budget request that we have submitted for your consideration will support meeting these objectives.

Thank you very much and I will be happy to respond to any questions you may have.

Mr. FAZIO. Thank you for your testimony, Mr. Scherman.

[CLERK'S NOTE.—The prepared statement of Mr. Scherman appears on page 64.]

ACE-FEDERAL REPORTING CONTRACT

Mr. FAZIO. Let me ask a couple of questions. I hate to start with one that puts you on the defensive, but I can't resist it.

An article in The Post on 15 February reported that FERC rejected a bid from Ace-Federal Reporters, Inc., to pay the Commission $1.25 million for the privilege of supplying stenographic reporting services at no cost to the Commission.

Apparently, the FERC contract is so lucrative in terms of transcript sales to other parties that Ace-Federal felt it could pay the Commission a "bonus," and still turn a tidy profit.

Yet, the Commission turned down this opportunity and instead awarded the contract to another bidder which offered no such bonus payments.

How can you justify the loss of $1.25 million to the U.S. Treasury at a time of massive budget deficits?

For that matter, why doesn't FERC skip the middleman and sell these materials to the public itself and derive some benefit from it?

Mr. SCHERMAN. Let me address that in three related parts.

First, the matter you referred to is currently pending before a Federal District Court Judge and, therefore, I would rather not comment on the specifics of the Ace matter.

What I would like to do is submit for the record, if I may, the Commission's position as filed with the Court just last week, and hopefully by the time post-hearing questions are submitted, we will be able to more fully explain the situation.

[The information follows:]

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

ACE-FEDERAL REPORTERS, INC.,)
)
Plaintiff,)
)
v.) Civil Action No. 90-0287 JGP
)
FEDERAL ENERGY REGULATORY)
COMMISSION, *et al.*,)
)
Defendants.)
)

MOTION OF THE DEFENDANT FEDERAL ENERGY REGULATORY COMMISSION FOR SUMMARY JUDGMENT

Pursuant to Rule 56, Federal Rules of Civil Procedure, defendant Federal Energy Regulatory Commission respectfully moves the Court for summary judgment in its favor on the ground that no genuine issue remains to be decided in this case, and defendant is entitled to judgment as a matter of law.

In support of this motion, defendant submits herewith a Statement of Material Facts As To Which There Is No Genuine Issue, the Declarations of James E. Thompson and Charlotte Greenwell, and a memorandum of points and authorities. The memorandum also serves as an opposition to plaintiff's Motion for Temporary Restraining Order and for Preliminary Injunction. A proposed order is also attached.

Respectfully submitted,

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

ACE-FEDERAL REPORTERS, INC.,)
Plaintiff,)
)
v.) Civil Action No. 90-0287 JGP
)
FEDERAL ENERGY REGULATORY)
COMMISSION, et al.)
Defendants.)

STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE

Pursuant to Rule 108(h) of the Local Rules of this Court, the defendant Federal Energy Regulatory Commission submits the following statement of material facts as to which there is no genuine issue:

1. The Federal Energy Regulatory Commission (FERC) is an independent agency within the Department of Energy, with broad jurisdiction over the nation's natural gas industry, electric utilities, hydroelectric projects, and oil pipeline transportation system.

2. The FERC administers numerous statutes and regulations involving such major energy issues as the transportation and sale of natural gas in interstate commerce, the regulation of electric utilities' wholesale rates and transactions, the licensing and inspection of private, municipal and state hydroelectric projects, and oversight on related environmental matters.

3. The FERC derives its authority from the Department of Energy Organization Act, Federal Power Act of 1935, the Natural

Gas Act of 1938, the Natural Gas Policy Act of 1978, and the Public Utility Regulatory Policies Act of 1978. Under these statutes, interested parties are given a right to a hearing for the resolution of most contested issues.

4. The FERC has promulgated regulations establishing formal proceedings similar to court trials. In such proceedings, a full stenographer's transcript of each proceeding is required. In addition, under the Government in the Sunshine Act, 5 U.S.C. § 552b, closed Commission meetings must be transcribed.

5. The need for stenographic services by the FERC is both continuous and vital for the fulfillment of the agency mission. Absent reliable stenographic services, much of the work of the Commission would quite literally grind to a halt. Ex. A at ¶ 4.

6. The Plaintiff, Ace-Federal Reporters, Inc. (Ace), holds the existing contract for stenographic services. This contract, DE-AC39-87RC-700001 (including option year 2), was scheduled to last from October 1, 1986 through August 31, 1989. The contract has been temporarily extended and is due to expire on February 28, 1990. Id. at ¶ 3.

7. The existing contract contains a quarterly report requirement. For most of the period of the contract, Ace, the incumbent contractor, failed to file the reports. Id. at ¶ 8.

8. On August 25, 1989, the Commission issued Solicitation DE-FB89-RC-00001 ("First Solicitation") for stenographic services because the existing contract was due to expire. The bid opening date was scheduled for September 25, 1989. Id. at ¶ 6.

9. The First Solicitation contained a quarterly report requirement identical to the one that Ace had failed to comply with in the existing contract. Id. at ¶¶ 8-9.

10. The First Solicitation did not contain bid bond and performance bond clauses or a conflict of interest clause. Id. at ¶ 10.

11. The contract specified in the First Solicitation also did not reflect recent legislative and regulatory changes, including the Service Contract Act and the latest amendments to the Federal Acquisition Regulations. Id. at 12.

12. On September 26, 1989, Kenneth F. Plumb, former Head of Contracting Activity (HCA) of the FERC, rendered a Determination and Findings in support of cancellation of the Solicitation. The Determination and Findings indicated that the specifications in the invitation for bid were ambiguous and had created confusion regarding the First Solicitation. Mr. Plumb found that cancellation of the First Solicitation was in the best interest of the government pursuant to 48 C.F.R. § 14.404-1(c)(1). Ex. J.

13. On September 5, 1989, five firms submitted bids on the First Solicitation. Four of the bids were for no-cost contracts. Ace submitted two bids. One of Ace's bids was for a no-cost contract to the government. Its cover letter offered performance beyond the requirements of the Solicitation (discs and an extra hard copy on all orders) and referred to an alternative bid under separate cover. The alternative bid offered to provide service to the FERC at no cost and to pay FERC "five cents per page for

all original pages ordered by the government." It did not "offer the service enhancement offered in its main bid." Instead, it included "at no cost, P.C. discs and extra copies as specified by the terms of the alternative bid." The bonus would have generated approximately $7900.00 per year for the government. Ex. L.

14. On October 12, 1989, Ace filed a protest, B-237414.1, before the GAO contesting this cancellation. Ex. I.

15. In the Contracting Officers' Statement, filed with the GAO on February 9, 1990, the contracting officer noted, with respect to Ace's previous bonus offer, that "the cost of administering the contract with a bonus would probably offset any benefit to the FERC or the government from the bonus." With respect to bonus bids, the Contracting Officer also noted that he was concerned about the "likelihood that additional costs incurred as a result of offering the bonus would be passed through to the public ...." Ex. M.

16. In an opinion dated January 31, 1990, the GAO ruled that the FERC properly exercised its discretion to cancel the First Solicitation because it did not contain a clause requiring bid and performance bonds. Ace-Federal Reports, B-237414. Ex. F.

17. On November 30, 1989, the Commission issued Solicitation DE-FB90-RC-00009 ("Second Solicitation") to replace the First Solicitation which was cancelled. Exs. G and H.

18. Although the Commission's previous solicitations for stenographic services typically specified a one year contract with options, the Second Solicitation was issued with the specification that the contract run for a base period of two years.

19. The Second Solicitation, like the first one, contained the standard availability of funds clause found at 48 C.F.R. § 52.232-18. This clause specifies that "[t]he Government's obligation under [the] contract is contingent upon the availability of appropriated funds . . . ." Ex. B at ¶ 8.

20. The Second Solicitation initially contained the following clause:

> L.12 Alternate bids
>
> Alternate Bids submitted within the scope of the solicitation will be considered.

21. On December 5, 1989, the Commission amended the Second Solicitation as follows:

> Under Section L. Instructions, Conditions and Notices to Offers, page 63 of the basic solicitation, Item L. 12. Alternate Bids, add to the heading "and Bonus Bids." At the end of the sentence under the heading add the following new sentence: "Bonus bids, including offers of additional sums to be paid to the Government, will not be considered."

22. On December 22, 1989, the Commission amended the Second Solicitation as follows:

> The purpose of this amendment is to delete provision L.12, entitled Alternative Bids, and substitute the provision L.12, entitled Alternate Proposal Information. In addition, this amendment will incorporate 90 days in Block 12 of the Standard Form 33, which was inadvertently left out. Accordingly.

> 1. Provision L.12 shall read: L.12 - ALTERNATE PROPOSAL INFORMATION, Alternate proposals are not solicited, are not desired, and shall not be evaluated.
>
> 2. Standard Form 33, Block 12 of the solicitation shall be revised to incorporate ninety (90) days.

Ex. H.

23. On December 29, 1989, Ace filed a protest with the GAO. In that protest, Ace stated that:

> The basis of the protest is that the FERC has included [certain] provisions [in the Second Solicitation] which violate statutory and public policy requirements relating to the award of government contracts, making the contract unawardable as offered. These provisions are . . . the refusal to consider bonus bids and the refusal to consider alternate bids.

Ex. I.

24. On February 5, 1990, bids to the Second Solicitation were opened. There were three zero bids. Ace offered another bonus bid, offering to pay the government a bonus with an estimated value of approximately $245,000 per year. Ex. B at ¶ 19.

25. On February 6, 1990, Ace contacted the FERC and maintained for the first time that bonus bids were permissible under the literal language of the Second Solicitation. Ex. C at ¶ 6.

26. On February 9, 1990, Ace was notified that its bonus bid was rejected as nonresponsive to the Second Solicitation. Ex. B at ¶ 20.

27. On February 12, 1989, pursuant to 48 C.F.R. § 14.407-6(a), the contract was awarded by lottery to Ann Riley and Associates, a small business.

Respectfully submitted,

Jay B. Stephens by cff

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United States Attorney

John D Bates by cff

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

ACE-FEDERAL REPORTERS, INC.,)
Plaintiff,)
)
v.) Civil Action No. 90-0287 JGP
)
FEDERAL ENERGY REGULATORY)
COMMISSION, *et al*.)
Defendants.)

MEMORANDUM OF POINTS AND AUTHORITIES IN SUPPORT OF DEFENDANT'S MOTION FOR SUMMARY JUDGMENT AND IN OPPOSITION TO PLAINTIFF'S MOTION FOR TEMPORARY RESTRAINING ORDER AND FOR PRELIMINARY INJUNCTION

INTRODUCTION

The defendant Federal Energy Regulatory Commission (FERC) respectfully submits this Memorandum of Points and Authorities in Support of its Motion for Summary Judgment, and in opposition to plaintiff's Motion for a Temporary Restraining Order and for a Preliminary Injunction.

For three reasons, this Court should grant the FERC's Motion for Summary Judgment. First, the Contracting Officer (CO) had a rational basis for his decision to cancel the FERC's August 25, 1989 solicitation for stenographic services, and to amend the FERC's November 30, 1989 resolicitation to exclude bonus and alternate bids. Second, the CO had a rational basis for his decision to exclude plaintiff's bonus bid in response to the resolicitation as nonresponsive because the resolicitation was amended to exclude bonus bids. And, third, the two year contract for stenographic services that was specified in the resolicitation does not violate the Anti-Deficiency Act, 31 U.S.C. § 1341. Thus, summary judgment should be granted the defendant because there are no material facts in dispute and defendant is entitled to judgment as a matter of law. Fed. R. Civ. Proc. 56.

Additionally, plaintiff's Motion for a Temporary Restraining Order and for a Preliminary Injunction should be denied because: 1) plaintiff is unlikely to prevail on the merits of its claim; 2) plaintiff fails to establish that it will be irreparably harmed absent the grant of injunctive relief; 3) the harm to other interested parties outweighs the harm to plaintiff; and 4) the public interest favors denying plaintiff's request for a preliminary injunction. Fed. R. Civ. Proc. 65. In any event, this Court should exercise its discretion to deny the plaintiff's request for injunctive relief because it lacks clean hands.

Factual Background

The Federal Energy Regulatory Commission (FERC) is an independent regulatory agency within the Department of Energy, with broad jurisdiction over the nation's natural gas industry, electric utilities, hydroelectric projects, and oil pipeline transportation system. It administers numerous statutes and regulations involving such major energy issues as the transportation and sale of natural gas in interstate commerce, the regulation of electric utilities' wholesale rates and transactions, the licensing and inspection of private, municipal and state hydroelectric projects, and oversight on related environmental matters. In particular, the FERC derives its authority from the Department of Energy Organization Act, 42 U.S.C. § 7101, et. seq., the Federal Power Act of 1935, 16 U.S.C. § 792 et seq., the Natural Gas Act of 1938, 15 U.S.C. § 717 et seq., the Natural Gas Policy Act of 1978, 15 U.S.C. § 3301 et seq., and the Public Utility Regulatory Policies Act of 1978, 16 U.S.C. § 2601 et seq. The Commission returns to the Treasury all of its annual operating expenses through the collection of user fees and charges.

Under the Commission's governing statutes, interested parties are given a right to a hearing for the resolution of most contested issues. As a result, the FERC has promulgated regulations establishing formal proceedings similar to court trials. In such proceedings, a full stenographer's transcript of each proceeding is required. In addition, under the Government in the Sunshine Act, 5 U.S.C. § 552b, closed Commission meetings must be transcribed.

Thus, the need for stenographic services by the FERC is both continuous and vital for the fulfillment of the agency mission. Absent reliable stenographic services, much of the work of the Commission would quite literally grind to a halt.

On August 25, 1989, the Commission issued Solicitation No. DE-FB89-RC-00001 (First Solicitation) for stenographic services. Declaration of James E. Thompson, Director of the Division of Procurement, dated November 20, 1989 and submitted to

GAO in GAO Bid Protest B-237414-1, [hereinafter referred to as First Thompson Declaration] ¶ 6; attached hereto as Exhibit A. It was discovered later that there were several problems with the Solicitation. Id. at ¶ 8-12. One problem was that the Solicitation did not contain a clause requiring bid bonds and performance bonds. As noted, reliable stenographic services are necessary in order for the FERC to accomplish its mission. Any failure to provide for reliable and continuous services would make it impossible for the agency to perform most of its functions. The contracting officer (CO) stated that, in his opinion, it was absolutely necessary to add these two bond requirements to the First Solicitation to protect the public's interest Id. at ¶ 10 (and, as illustrated below, the GAO found that the ommission of the clause was a compelling reason to cancel the First Solicitation).

There were also a number of other problems with the First Solicitation. The First Solicitation contained a requirement that the contractor report information relating to the sales of duplicate copies of transcript pages to parties other than the FERC, and the number of original transcript pages delivered to the FERC. Id. at ¶ 8. This information had to be submitted in accord with certain specifications, which were noted. Exhibit G, clause C.1. However, for most of the period of the contract, the incumbent contractor and plaintiff in this proceeding, Ace-Federal Reporters, Inc. (Ace), failed to file these reports as required by the existing contract. First Thompson Declaration

¶ 8. Ace claimed that the requirement was orally waived, but no one on the procurement staff recalled waiving it. Id. Other potential bidders on the First Solicitation complained that this information, if available, would have assisted them in the preparation of their bids. Id. at ¶ 7. There was a great deal of confusion surrounding the necessity of this information and its usefulness to the Commission, the public and interested private parties. Id. at ¶ 9.

The First Solicitation was also flawed because it did not contain a conflict of interest clause, nor did it reflect recent legislative and regulatory changes including the Service Contract Act and the latest amendments to the Federal Acquisition Regulations (FAR). Id. at ¶ 11, 12. It also did not contain a clause referring to the potential loss of exhibits by a stenographer. Id. at ¶ 12. Because of these problems, which were revealed in progression, the First Solicitation was cancelled after bid opening on September 27, 1989 because it was "ambiguous" and because cancellation was in the best interest of the government under 48 C.F.R. § 14.404-1(C)(1). Id. at ¶ 14; Determination and Findings in support of Cancellation of Invitation for Bid, dated September 26, 1989. Exhibit J.

Shortly thereafter, on October 12, 1989, Ace, as the incumbent contractor, whose bid included a bonus offer to the government of approximately $7,900 per year, filed a protest before the General Accounting Office (GAO) contesting the cancellation. Exhibit I. On November 20, 1989, the FERC submitted its formal response to Ace's protest. In an opinion dated January 31, 1990, the GAO ruled that the FERC properly exercised its discretion to cancel the First Solicitation because it lacked a clause requiring bid and performance bonds. Ace-Federal Reporters, Inc., B-237414, attached hereto is Ex. F.

Some three weeks after the cancellaiton of the First Solicitation, on October 13, 1989, the CO, James Thompson, wrote a letter to GAO introducing himself as the FERC's new CO. Exhibit K. In the course of the letter, Mr. Thompson stated his opinion that Ace's bonus bid of approximately $7900 was in any event not responsive to the First Solicitation and observed that the bonus was no inducement to the FERC since any money it collected would be deposited in the general funds of the Treasury. This statement expressed Mr. Thompson's opinion at that time about whether Ace's bonus bid would have been responsive to the First Solicitation had it not been cancelled. Exhibit H. The opinion did not relate to the Commission's grounds for cancelling the First Solicitation.

On November 30, 1989, the Commission issued Solicitation No. DE-FB90-RC-00009 ("Second Solicitation") to replace the First Solicitation which had been cancelled. The Second Solicitation specified a 2 year contract and specifically stated that it was contingent upon the availability of funds. Declaration of James E. Thompson dated February 9, 1990, and submitted to GAO in GAO Bid Protest B-238173-1 [hereinafter referred to as Second Thompson Declaration] ¶ 6. Ex. H, Clause I.5. This Solicitation also specified that alternate bids would be considered. Second Thompson Declaration ¶ 6. The clause read:

> L.12 Alternate Bids
>
> Alternate bids submitted within the scope of this solicitation will be considered.

Declaration of Charlotte A. Greenwell, Contract Specialist dated February 9, 1990 and submitted to GAO in GAO Bid Protest B-238173.1 [hereinafter referred to as First Greenwell Declaration] ¶ 3 and Delcaration of Charlotte A. Greenwell, dated February 21, 1990 [hereinafter referred to as a Second Greenwell Declaration] ¶ 3. Shortly after the Second Solicitation was issued, the CO determined that bonus bids would not be beneficial to the government. Second Thompson Delcaration ¶ 11. The CO reached this conclusion based on his previous experience with Ace's $7900 bonus bid under the First Solicitation. Id. When he made this decision, he reasonably believed that the cost of administering the contract with a bonus would probably offset any benefit the government would derive from it. Id. He noted that the Commission's representative, the procurement staff and the agency budget staff would all have to expend numerous hours to administer such a contract. Id. In addition, he concluded that the administration of the contract would probably require an expenditure of FERC personnel resources for compliance and auditing functions that would outweigh the value of the potential payments received. Id.

In deciding to exclude bonus bids, the CO also considered the likelihood that additional costs incurred by a contractor as a result of offering the bonus would be passed through to the public in the form of higher transcript costs. Id. at ¶ 13. (Many of the purchasers of transcripts are captive customers, i.e., energy companies and the law firms which represent them. Their costs would likely be passed through to rate payers. Moreover, smaller companies, consumer groups and state and local governments would also be subject to these higher costs.) Another potential bidder and intervenor in this action, Ann Riley & Associates, Ltd. (Ann Riley) had raised the issue of higher costs to the public in response to Ace's submission of a bonus bid to the First Solicitation. Id. at ¶ 12. To eliminate these problems, on December 5, 1989, the Second Solicitation was amended to exclude bonus bids:

> Under Section L, Instructions, Conditions and Notices of Offers, page 63 of the basic Solicitation, Item L.12, Alternate Bids, add to the heading "and Bonus Bids." At the end of the sentence under the heading add the following new sentence: Bonus Bids, including offers of additional sums to be paid to the Government will not be considered.

[The December 5, 1989 amendment to the Second Solicitation is hereinafter referred to as the First Amendment]; Second Thompson Declaration ¶ 14; Exhibit H.

Shortly after the Second Solicitation was amended to exclude bonus bids, a decision was made to exclude alternate bids as well. First Greenwell Declaration ¶ 5, 8; Second Greenwell Declaration ¶ 4. About that time, a potential bidder contacted the FERC and complained that the FERC had not specified what it was looking for in terms of an alternate bid. First Greenwell Declaration ¶ 4. This bidder also complained that Ace, as the incumbent contractor, was in a better position to respond to this ambiguity because it was familiar with the Commission's stenographic services operations. Id. Charlotte Greenwell, a contract specialist, reviewed the clause and determined that it was flawed because it did not contain any evaluative criteria for analyzing alternate bids. Id. at ¶ 6. There were no guidelines by which the adequacy of such a bid could be measured. Id. at ¶ 7. She also found that there was a significant possibility that Ace would be advantaged by the ambiguity in the clause because its status as the incumbent contractor did, in fact, give it insight that the other bidders did not have. Id. at ¶ 8. Thus, on December 22, 1989, the Second Solicitation was amended to bar alternate bids as well. Id. at ¶ 8; Second Greenwell Declaration ¶ 6. This amendment made no reference to the earlier amendment which had excluded bonus bids. It reads as follows:

> The purpose of this amendment is to delete provision L.12, entitled Alternative Bids, and substitute the provision L.12, entitled Alternate Proposal Information. In addition, this amendment will incorporate 90 days in Block 12 of the Standard Form 33, which was inadvertently left out, accordingly.
>
> 1. Provision L. 12 shall read: L. 12 - ALTERNATE PROPOSAL INFORMATION, Alternate proposals are not solicited, are not desired, and shall not be evaluated.
>
> 2. Standard Form 33, Block 12 of the Solicitation shall be revised to incorporate ninety (90) days.

[The December 22, 1989 amendment is hereinafter referred to as the "Second Amendment"].

Ace understood that the purpose and effect of these amendments were to exclude bonus and alternate bids. In fact, it filed a protest with the GAO on December 29, 1989, seven days after the second amendment, specifically contesting the Second Solicitation's provisions which "refus[ed]" to consider bonus and alternate bids. Ex I, p. 1. Thus, at the time Ace submitted its bonus bid, it was aware that bonus and alternate bids had been barred under the Second Solicitation.

On February 5, 1990, Kenneth Plumb, former Executive Director, issued a Determination and Findings that in view of the necessity of stenographic services to the Commission's operations, it was necessary to proceed with the award of the contract, notwithstanding Ace's protest which is pending before the GAO. Second Thompson Declaration ¶ 18. Notice of this Determination and Findings was given to the GAO in a letter dated February 8, 1990. Id. Also, on February 5, 1990, bids to the Solicitation were opened. Id. ¶ 19. There were three zero bids. Ace, as noted, offered another bonus bid, offering to pay the government approximately $245,000 per year. Id.

On the morning of February 6, 1990, the day that the Commission's response to Ace's protest was due and one day after bid opening, Ace claimed for the first time, contrary to its own pleadings before the GAO, that the Second Solicitation technically permitted bonus bids. Declaration of James E.

Thompson, Director of Division of Procurement, dated February 22, 1990 attached hereto as Exhibit C, [hereinafter referred to as Third Thompson Delcaration] ¶ 6. In particular, Ace claimed that the FERC had deleted the bar against bonus bids when it amended the Second Solicitation to exclude alternate bids. Id.

On February 12, 1990, in compliance with the applicable regulations, the contract was awarded by lottery to a qualifying zero bidder, Ann Riley. Third Thompson Delcaration ¶ 7. Ace was notified that its bid was rejected as nonresponsive to the Solicitation. Second Thompson Declaration ¶ 20. On February 12, 1990, Ace initiated this action in the District Court basically reiterating the positions it has already raised before the GAO, and seeking declaratory and injunctive relief.

ARGUMENT

A. The Contracting Officer did not Abuse his Wide Discretion in Deciding to Cancel the First Solicitation.

Congress has mandated that "all sealed bids or competitive proposals received in response to a Solicitation may be rejected if the agency head determines that such action is in the public interest." 41 U.S.C. § 253b. Award should generally be made to the lowest responsible bidder "unless there is a compelling reason to reject all bids and cancel the invitation." 48 C.F.R. § 14.404-1(a)(1). Moreover, COs should be "allowed wide latitude to exercise business judgement" as they safeguard the interest of the United States in its contractual relationships. 48 C.F.R. § 1.602-2.

The Comptroller General has consistently emphasized the wide latitude accorded COs in determining if the requisite compelling reasons exist to cancel a Solicitation. *See*, *e.g.*, *Hybrid Technology Group, Inc.*, 84-2 CPD ¶ 385 ("the authority vested in the contracting officer to decide whether or not to cancel an invitation and readvertise is extremely broad.") *See also* *Non-public Educational Services, Inc.*, 83-1 CPD ¶ 232 ("We have long recognized that the authority of a contracting officer to cancel a Solicitation is extremely broad and, in the absence of bad faith or an abuse of discretion, a decision to cancel a Solicitation will be upheld.")

In this case, the decision to cancel the First Solicitation was well within the agency's discretion to determine the public interest. The First Solicitation had a number of problems, perhaps most noteworthy was the absence of bid and perform bond clauses. The CO was reasonably concerned about this omission in view of the necessity of stenographic services for the Commission's operations. He reasoned that the absence of such a clause would leave the Commission unprotected in teh event of a default. The GAO found this concern reasonable. It noted:

> We find reasonable FERC's determination that bid and performance bonds are necessary and conclude that the need for bond requirements is a sufficiently compelling reason for cancellation of the IFB. In this regard, our Office has found reasonable the imposition of bond requirements where continuous operation of critical services is necessary. *See IBI Sec., Inc.*, B-235856, Sept. 27, 1989, 89-2 CPD ¶ 277 (bid and performance bonds found necessary to ensure uninterrupted performance of security guard

> service). We have recognized that bond requirements are a proper means of securing to the government the fulfillment of the contractor's obligation under the contract in appropriate circumstance. Id.
>
> Ace does not question that the continuous performance of the stenographic services is essential to the performance of the agency's duties. Rather, Ace appears to argue that the small dollar amount of the bonds in the resolicitation will not ensure the performance of these services. However, we have recognized that while bond requirements do not necessarily guarantee performance they are a useful means of heightening the likelihood of receiving satisfactory performance. IBI Sec., Inc., B-235857, supra, at 3.
>
> Furthermore, we do not agree with Ace that FERC is precluded from asserting its need for bid and performance bonds simply because Ace prior to bid opening questioned the contract specialist about the omission of the bond requirements. The record shows that after bid opening the contracting officer learned that the IFB omitted the requirement for bid and performance bonds and disagreed with this omission. While Ace argues that the requirement for bid and performance bonds should have been known prior to bid opening, a procuring agency is not precluded from considering information relating to whether there is a sufficient reason to cancel a Solicitation no matter when the information surfaces or should have been known. Independent Gas Producers Corp., B-229487, Mar. 2, 1988, 88-1 CPD ¶ 217.

Moreover, there were other defects in the Solicitation. In addition to the omission of a bid and performance bond clause, the inclusion of a mandatory quarterly reporting clause in the First Solicitation, which Ace had not complied with for most of the period of the existing contract for stenographic services, created confusion among FERC personnel, potential bidders on the

First Solicitation, and Ace. The absence of the reports required to be filed by Ace deprived other bidders of information that would have been helpful to them in formulating their bids.

Under similar circumstances, the Comptroller General found that a CO had a reasonable basis for cancelling a Solicitation. In Logistical Support, Inc., 84-1 CPD ¶ 191, an Invitation For Bids omitted a wage determination clause. Although it was theoretically possible to correct this omission through a later modification of the contract, the Comptroller General held that the CO had a reasonable basis for his determination to cancel the IFB and to issue a new solicitation for the services. Id. This holding was supported by the general policy that "[a] contractor should not be selected on a different basis than that from which it must perform the contract." Id. Similarly, in this case, the CO acted properly in cancelling the defective First Solicitation so that a Second Solicitation could be issued which would reflect the actual administration of the contract.

The CO also reasonably concluded that other omissions and defects in the First Solicitation would significantly affect the public interest. The omission of a conflict of interest clause also posed a threat to the public interest. Id. at ¶ 11. In an era where procurement integrity is increasingly important throughout the government, the justification and relevance of such a clause is readily apparent. Finally, the First Solicitation did not reflect recent legislative and regulatory changes such as the Service Contract Act and the latest amendments to the Federal Acquisition Regulations. Id. at ¶ 12.

In sum, the CO articulated a number of compelling reasons why cancellation of the First Solicitation served the public interest. The omission of a bid and performance bond clause, which constituted the basis of the GAO's decision, and a conflict of interest clause and the problems surrounding the reporting requirement clause would each individually merit cancellation of the Solicitation. Taken together, it is clear that the CO was acting well within his wide discretion when he cancelled the First Solicitation.

The GAO ruling and the CO decision should be accorded judicial deference because they are soundly grounded on a rational basis. See M. Steinthal, 455 F.2d at 1301. Both the CO and the GAO have articulated clear rational reasons as to why the CO's decision to cancel the First Solicitation was a proper one. Administering the contract properly would require the combined efforts of the Commission's representatives, the procurement staff, and the agency budget staff.

Ace has repeatedly emphasized the CO's October 13, 1989 letter to the GAO. The letter, on its face, merely comments on the nonresponsiveness of Ace's bonus bid to the First Solicitation. The question of bid responsiveness has little to do with the issues relating to the cancellation of the First Solicitation. As noted, the CO has articulated several reasons which justify his decision to cancel the First Solicitation and the GAO upheld his decision.

B. The Second Solicitation was Amended to Exclude Bonus and Alternate Bids.

The Second Solicitation was initially issued with the following clause:

> L.12 Alternate Bids
>
> Alternate bids submitted within the scope of this solicitation will be considered.

Thereafter, two independent amendments were adopted to this original clause L.12. The first amendment barred bonus bids. It was issued on December 5, 1989 and reads as follows:

> Under Section L, Instructions, Conditions and Notices to Offerors, page 63 of the basic Solicitation, Item L.12, Alternate Bids, add to the heading "and Bonus Bids". At the end of the sentence under the heading add the following new sentence: "Bonus Bids, including offers of additional sums to be paid to the Government, will not be considered.

The second amendment to the original L.12 clause was issued on December 22, 1989, and it reads as follows:

> The purpose of this amendment is to delete provision L.12, entitled Alternative Bids, and substitute the provision L.12, entitled Alternate Proposal Information. In addition, this amendment will incorporate 90 days in Block 12 of the Standard Form 33, which was inadvertently left out. Accordingly.
>
> 1. Provision L.12 shall read: L.12 - ALTERNATE PROPOSAL INFORMATION, Alternate proposals are not solicited, are not desired, and shall not be evaluated.
>
> 2. Standard Form 33, Block 12 of the Solicitation shall be revised to incorporate ninety (90) days.

The net effect and clear intent of these amendments was to leave in place the prohibition against bonus bids, and to add the prohibition against alternate bids. The second amendment made no reference to the earlier prohibition against bonus bids and gave no other indication of any intent to permit bonus bids. Had the Commission intended to remove the bar against bonus bids, adopted in the first amendment, it would have referred to that amendment, which was titled "Alternate Bids and Bonus Bids." Instead, it refers only to the original L.12 clause which was entitled "Alternate Bids."

In fact, Ace understood that the effect and intent of the amendments were to remove bonus and alternate bids from consideration. In a protest to the Second Solicitation that Ace filed with the GAO on December 29, 1989, Ace stated:

> The basis of the protest [is] that the FERC has included . . . provisions [in the Second Solicitation] which violate statutory and public policy requirements relating to the award of government contracts, making the contract unawardable as offered. These provisions [include] . . . the refusal to consider bonus bids and the refusal to consider alternate bids.

Ex. I, p. 1.

The other bidders to the Second Solicitation interpreted the amendments to exclude bonus and alternate bids as well. This was the most reasonable interpretation of the contract language, and the clear intent of the FERC.

It was not until February 6, 1990, the day after bid opening, that Ace contacted the FERC and maintained for the first time that bonus bids were permissible under the literal language of the Second Solicitation. If that was indeed the case, Ace remained silent (for over a month) in the face of what was, from its point of view, an ambiguity. Instead of bringing the discrepancy to the CO's attention, Ace sought to capitalize on the ambiguity. Such actions have been frowned upon by the courts. See S.O.G. of Arkansas v. United States, 546 F.2d 367, 370-71 (1977) (The "contractor, before bidding, should attempt to have the Government resolve a patent ambiguity in the contract's terms . . . ."). Cf. W.P.C. Enterprises, Inc v. United States, 323 F.2d 874 Ct.Cl. (1963).

C. The CO Did Not Abuse his Wide Discretion in Amending the Second Solicitation to Exclude Bonus Bids and Alternate Bids.

CO's should be "allowed wide latitude to exercise business judgment" as they safeguard the interests of the United States in its contractual relationships. 48 C.F.R. § 1.602-2. In this case, the CO made the determination, based on sound reasoning, that the problems that alternate and bonus bids would generate for the government, under the circumstances of this case, would likely outweigh any of the benefits they would provide to the government. Ex. A at ¶¶ 9-17; Ex B at ¶¶ 3-5. Procurement statutes and regulations give a CO wide discretion to evaluate offers. Kinnett Dairies, Inc. v. Farrow, 580 F.2d 1260, 1272 (5th Cir. 1978). To meet its burden, plaintiff must show a "clear error of judgment" so as to deprive the CO's actions of a "rational basis." Ethyl Corp. v. EPA, 541 F.2d 1, 35 n.74 (D.C.

Cir.), cert. denied, 426 U.S. 941 (1976). A plaintiff must show not that another person, or even another CO, might have found differently, but rather that it was irrational for the CO to have taken the action that he took. M. Steinthal & Co., 455 F.2d at 1301. The question is whether the CO acted within the limits of his discretion or whether any state of facts may reasonably be conceived that would justify his decision. Wheelabrator Corp. v. Chaffee, 455 F.2d 1306, 1309, 1312 (D.C. Cir. 1971).

The CO's experience with Ace's previous bonus offer of about $7900 per year enabled him to determine that the value of the bonus, or any other bonus likely to be offered, was clearly outweighed by the administrative costs, in terms of personnel resources and man hours, necessary for the processing of such payments. At that time, the CO could not anticipate that Ace would later make a bonus offer of approximately $245,000 per year. This offer is approximately 30 times higher than Ace's previous offer. The court must review the CO's decision based on the information that was reasonably available to him at the time. Ace did not make the much larger offer until after the CO had removed such bids from consideration, and Ace had recognized in its pleadings to GAO that it was precluded from offering a bonus.

The CO was also legitimately concerned about the probability that the cost of offering a bonus to the government would be recouped by charging the public higher transcript prices. As noted, many of the purchasers of transcripts are captive customers, i.e., energy companies and the law firms which represent them. Their costs would likely be passed through to rate payers. Moreover, smaller companies, consumer groups and state and local governments would also be subject to these higher costs. Unlike user fees or charges, which are designed to recover the government's operating costs, additional costs to the public to support a bonus would represent charges to the public for costs the government had never incurred. In excluding bonus bids from consideration, the CO was simply exercising his discretion to frame the Second Solicitation in a manner that he reasonably concluded would best accommodate the government's needs. The Comptroller General has repeatedly recognized that "the method an agency chooses to accomplish its needs is primarily a matter within the agency's discretion." Steel Circle Building Co., 89-1 CPD ¶ 139; see also Kisco Company, Inc., 85-1 CPD ¶ 334 ("Although the protester disagrees with the agency's method of procuring . . . , the determination of the government's needs and the best method of accommodating them are primarily the responsibilities of the procuring activity"); A.T. Kearney, Inc., 83-1 CPD ¶ 190 ("It is a fundamental procurement principle that the determination of the needs of the government and the methods of accommodating [them] are primarily the responsibilities of the [g]overnment's contracting agencies.")

Applying this precedent here, it is clear that the CO acted well within his broad discretion in amending the Solicitation to exclude bonus bids. Ace should not be allowed to substitute its judgment concerning the needs of the government for that of the CO's.

Similarly, the CO acted well within his wide discretion when he amended the Second Solicitation to bar alternate bids. Although it initially appeared that such a clause would benefit the government, Ms. Greenwell later determined that the clause was flawed. Ex B at ¶¶ 4-7. It did not contain any evaluative criteria that would guide potential bidders in structuring their bids. Id. In this regard, Ace, as the incumbent contractor, may have had an unfair advantage. The Solicitation did not contain any guidelines for the agency to follow in evaluating alternate bids. Thus, if the agency received two alternate bids it had no way to determine which was more advantageous to the government. Even if only one alternate bid was received, it would be difficult to evaluate without objective criteria. In view of the unfairness to potential bidders, and the perceived advantage of Ace as the incumbent contractor, the CO reasonably determined that alternate bids would not be beneficial to the government under the circumstances of this Solicitation. Thus, he properly amended the Second Solicitation to exclude them from consideration. As the Comptroller General has noted, see supra at pp. 9-10, this type of determination is clearly within the CO's discretion.

The CO has articulated clear reasons why bonus and alternate bids will not be very beneficial to the government, and his decision as noted, should be accorded judicial deference. See

M. Steinthal & Co., 455 F.2d at 1301. Ace's opinion that it knows more accurately than the CO what is better for the government is not a basis for disturbing the CO's sound business judgment. Cf. B.C. Cleaning & Maintenance Corp., 87-1 CPD ¶ 56 (CO only needs a sufficient reason to amend the Solicitation). Neither the Ace nor any other potential bidder has been precluded from competing under the Solicitation. The CO simply exercised his wide discretion to amend the Solicitation to insure that the actual needs of the government would be accommodated.

D. The Two-year Contract that was Specified in the Second Solicitation Does Not Violate the Anti-Deficiency Act.

The FERC's Second Solicitation for stenographic services provides for a two year base period. Contrary to the Protester's assertion, this contract does not violate the Anti-Deficiency Act, 31 U.S.C. § 1341(a)(1). That Act provides that an officer or employee of the United States Government may not involve the government in a contract or obligation for the payment of money before an appropriation is made unless authorized. Here, the Solicitation specifically stated that:

> Funds are not presently available for this contract. The Government's obligation under this contract is contingent upon the availability of appropriated funds from which payment for contract purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the Contracting Officer for this contract and until the Contractor receives notice of such availability, to be confirmed in writing by the Contracting Officer.

Ex. H at 33, clause I.5. Moreover, even if the FERC had not received a zero bid in response to the Second Solicitation, the "availability of funds" clause in the Second Solicitation would have precluded any possible violation of the Anti-Deficiency Act because the government could not incur any expenditure or obligation under the contract until the necessary funds had been properly appropriated.

Additionally, the CO reasonably anticipated that the FERC would receive zero bids in response to the Second Solicitation. The FERC's current contract with Ace is a no cost contract. Moreover, in the past, the Commission usually entered into no cost contracts for stenographic services. Indeed, the FERC received several zero bids in response to the August 25, 1989 First Solicitation for stenographic services which was ultimately cancelled. The FERC also received three zero bids in response to the Second Solicitation.

II. THE PLAINTIFF'S MOTION FOR A TEMPORARY RESTRAINING ORDER OR PRELIMINARY INJUNCTION SHOULD BE DENIED.

A. Standard for a Temporary Restraining Order and Preliminary Injunction.

Under the Administrative Procedure Act, a Court may "hold unlawful and set aside" an agency action only if the action is found to be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A).

When contractors challenge the procurement process, they:

> bear a heavy burden of showing either that (1) the procurement official's decision on matters committed primarily to his own discretion had no rational basis, or (2) the procurement procedure involved a clear and prejudicial violation of applicable statutes or regulations.

Kentron Hawaii, Ltd. v. Warner, 480 F.2d 1166, 1169 (D.C. Cir. 1973) (citations omitted). See also M. Steinthal & Co. v. Seamons, 455 F.2d 1289, 1299 (D.C. Cir. 1971) (injunction should not issue simply because the Court believes the agency action to be "ill considered, or to represent the less appealing alternative"); Wheelabrator Corp. v. Chafee, 455 F.2d 1306, 1312 (D.C. Cir. 1971) (injunction should not issue unless the agency action "violates a clear command of the governing law, and . . . no state of facts may reasonably be conceived that would justify the administrative action."); Community Economic Development v. U.S., 577 F. Supp. 425, 426 (D.D.C. 1983) (A disappointed bidder seeking to overturn the award of a government contact to one of its competitors bears a very heavy burden of proof). To meet its burden, a contractor must show a "clear error of judgment" so as to deprive the agency official's actions of a "rational basis." Ethyl Corp. v. EPA, 541 F.2d 1, 35 n.74 (D.C. Cir.), cert. denied, 426 U.S. 941 (1976).

This Court will exercise restraint in considering whether to overturn a government procurement decision. M. Steinthal & Co., 455 F.2d at 1300, 1301; Sun Ship, Inc. v. Woolsey, 484 F. Supp. 1348, 1355 (D.D.C. 1979). An injunction is an extraordinary remedy. American Coastal Line Joint Venture, Inc. v. U.S. Lines, 580 F. Supp. 932, 935 (D.D.C. 1983). A reviewing court should "consider carefully and attentively the peculiar circumstances of each case, with a view towards limiting judicial intervention into the procurement process." M. Steinthal & Co., 455 F.2d at

1300; Community Economic Development, 577 F. Supp. at 426. (The Court of Appeals for this Circuit has "articulated a policy of restrained and infrequent judicial intervention in awards of government contracts.") Even if an aggrieved bidder can demonstrate that there was no rational basis for the agency's decision, the court still has the discretion, in the presence of overriding public interest considerations, to refuse to entertain declaratory or injunctive actions. M. Steinthal, 456 F.2d at 1301.

A party moving for such interim relief must show (1) that it has a strong likelihood of prevailing on the merits of the complaint; (2) that without the granting of the interim relief, it will be irreparably injured; (3) that the injunction will not harm others; and (4) that the public interest will be served by the interim relief. Washington Metropolitan Area Transit Commission v. Holiday Tours, Inc., 559 F.2d 843, 845 (D.C. Cir. 1977); Optic-Electronic Corp. v. United States, 683 F. Supp. 269, 270 (D.D.C. 1987) (Penn, J.). As shown below, plaintiff cannot make the requisite showing for a TRO or a preliminary injunction.

B. Plaintiff Is Unlikely to Prevail in This Case.

As demonstrated earlier in this brief, plaintiff cannot prevail on its claims that it should have been awarded the FERC's contract for stenographic services. Here, the GAO has already ruled that the FERC had compelling reasons to cancel the First Solicitation. Exhibit F. To find plaintiff likely to succeed in its appeal of the First Solicitation would entail a finding by this Court that both the FERC and the GAO determinations lack any rational bases. The D.C. Circuit has held that "we must acknowledge that the office headed by the Comptroller General provides unique experience in the area of government procurement and a tradition of care and objectivity, including freedom from prior involvement in the matter at hand, that would have provided 'the court with additional guidance in resolving the issues before it.'" M. Steinthal & Co., 455 F.2d at 1298 (citation omitted). A court's reluctance to interfere with the executive procurement process should be especially strong where, as here, the GAO has made a determination upholding the procurement officials on the merits. Id. at 1304. "[W]e think it appropriate to observe that the GAO is an arm of the legislature which is independent of the executive branch, and has an accumulated experience and expertise attested to by a substantial volume of bid protest cases filed and decided, a volume that has been increasing markedly in recent years." Id. at 1305.

Ace is also unlikely to prevail on its argument that it should be awarded the contract for stenographic services under the Second Solicitation. Clearly, the FERC had a rational basis for its decision to amend the Second Solicitation to exclude both bonus and alternate bids. When the CO made the decision in early December 1989 to exclude bonus bids, he made this determination based on the FERC's past experience with bids for the stenographic services contract. Prior to the First Solicitation in September, the FERC had never received a bonus bid in response to a solicitation for stenographic services. In September 1989, it received one bonus bid in response to the First Solicitation. That bid from Ace offered to pay the government approximately $7900 per year for the contract. The CO reasonably concluded that there was no real benefit to the government from a bonus bid in that amount or a similar amount because the cost of administering this provision would probably outweigh the value of the bonus offered to the government. This determination is clearly one within the wide discretion accorded to CO's. At the time the CO made his decision, he could not reasonably have anticipated that Ace would later offer a bid approximately 30 times higher than its previous bonus bids. This court must judge whether the CO had a rational basis for making his decision at the time he made it, not with the benefit of hindsight.

Similarly, the FERC also had a rational basis for its decision to exclude alternate bids from the Second Solicitation. One of the alternate bidders had complained that the alternate bid clause in the Second Solicitation did not provide sufficient evaluative criteria to enable it to fashion a responsive bid. First Greenwell Declaration ¶ 4. This bidder also complained that Ace, as the incumbent contractor, had an advantage because of the lack of evaluative criteria since it was familiar with the Commission's stenographic operations. Id. After carefully reviewing the Second Solicitation, the Acting Director of Procurement rationally concluded that the existing alternate bid clause was unfair to potential bidders and decided to exclude alternate bids from consideration. Id. at ¶ 5, 8.

Finally, Ace cannot establish that it is likely to succeed on the merits of its claim that the Second Solicitation, as amended, permitted bonus bids. At this time, the GAO is adjudicating a protest filed by Ace after the FERC had issued both the amendments excluding bonus bids and alternate bids. As noted above, Ace took the position in that protest that the FERC did not have the authority to exclude bonus bids. Ace now argues to this Court that the December 22, 1989 second amendment to clause L.12 must be interpreted as having cancelled the prior amendment prohibiting bonus bids, thus permitting bonus bids. Ace, however, certainly did not interpret the second amendment in that way on December 29, 1989 when it specifically argued to the GAO that one of the reasons that the resolicitation was improper was its prohibition on bonus bids. Ace Protest Letter to GAO, December 29, 1989. Ace cannot credibly argue to this Court now that it was irrational for the FERC to interpret the resolicitation as prohibiting bonus bids, when Ace itself has already stated on the record before the GAO its position that the resolicitation, with amendments, prohibited both bonus bids and alternate bids.

B. Plaintiff Fails to Establish That It Will Be Irreparably Harmed Absent a Preliminary Injunction

Ace complains that it will lose substantial profits after March 1, 1990 if the FERC contract is awarded to another stenographic services company. Ace contends that this loss of profits constitutes irreparable harm because disappointed bidders who ultimately prevail in government procurement cases cannot recoup lost profits.

Plaintiff cannot demonstrate that in the absence of a stay, it will suffer irreparable harm. In its brief, Ace claims that it is "well-settled" that a disappointed bidder's anticipated loss of profits constitutes irreparable harm for purposes of injunctive relief. However, economic injury, standing alone, is not sufficient to show irreparable harm. As the D.C. Circuit has held:

> It is also well settled that economic loss does not, in and of itself, constitute irreparable harm. As this court has noted:
>
> > The key word in this consideration is irreparable. Mere injuries, however substantial, in terms of money, time and energy necessarily expended in the absence of a stay are not enough. The possibility that adequate compensatory or other corrective relief will be available at a later date, in the ordinary course of litigation weighs heavily against a claim of irreparable harm.
>
> Virginia Petroleum Jobbers Ass'n v. FPC, 259 F.2d at 925. Recoverable monetary loss may constitute irreparable harm only where the loss threatens the very existence of the movant's business. See Washington Metropolitan Area Transit Comm's v. Holiday Tours, Inc., 559 F.2d 841, 843 n.2 (D.C. Cir. 1977).

Wisconsin Gas Co. v. FERC, 758 F.2d 669, 674 (D.C. Cir. 1985). Here, Ace has not alleged in its motion for injunctive relief or in the affidavit of its president, Robert J. Monick, that the loss of FERC's contract for stenographic services will put it out of business. Thus, it cannot meet the very high standard of irreparable injury. In American Coastal Line Joint Venture v. U.S. Lines, 580 F. Supp. 932, 936 (D.D.C. 1983), the District Court for the District of Columbia found that the plaintiff failed to make a sufficient showing of irreparable harm although it alleged that it would lose a contract that constituted 72% of its business and claimed it would be forced out of business. There, the court specifically noted that the plaintiff had other business. Applying this precedent to this case, it is clear that Ace's bald assertion that it will lose anticipated profits is insufficient to warrant injunctive relief. Ace is a large business. It can easily survive until this dispute is resolved.

Moreover, if this court grants the relief requested by Ace, i.e. orders the FERC to award the contract to Ace, Ace will receive all of its anticipated profits. It will have the contract for the full term. There will only be a delay in the receipt of these profits sufficient to allow this Court to determine whether the FERC had a rational basis for its actions. Thus, it has an adequate remedy at law.

Additionally, the D.C. Circuit has found that the availability of a remedy, i.e. recovery of bid preparation costs, provides a sound equitable basis for a court to exercise its discretion to decline granting declaratory or injunctive relief. M. Steinthal, 455 F.2d at 1302-03. See Lametti & Sons, Inc. v. City of Davenport, 432 F. Supp. 713, 715 (S.D.Iowa 1975). (While bid preparation costs may not be an "adequate" remedy in light of lost profits, the fact that plaintiff is not completely without remedy is an important consideration.) It is appropriate to deny injunctive relief even if a bidder in fact cannot obtain recovery for loss of anticipated profits:

> Although this is, of course, a possibility, it is not one so poignant or painful as it might initially appear to those schooled in private contract controversies. A fundamental difference between government procurement and private contract litigation is evidenced by the clause, standard and required in government contracts, whereby the government reserves the right, even in the case of a duly executed contract, to terminate the contract "for the convenience of the government". . . . The termination-for-convenience clause "lodge[s] in the contracting officer the fullest of discretion to end the work 'in the best interests of the Government'". . . . On the basis of the contracting officer's wide, though not completely unbridled, discretion under this clause to terminate a contract for the best interests of the Government, the courts have denied the contractor recovery for anticipated profits.

M. Steinthal & Co., 455 F.2d at 1304.

Further, Ace's allegations of irreparable harm are unsubstantiated and speculative. Neither Ace's Memorandum in Support of its Motion, nor the Affidavit of Robert J. Monick, specify in any detail the losses that Ace will incur if it does not receive an injunction. Mr. Monick merely contends that Ace will be forced to "scale back" its operations. Monick Affidavit ¶ 13(a). While alluding to the possibility that Ace will be forced to lay off some personnel, Mr. Monick fails to list the number of employees expected to be laid off. Mr. Monick also complains that a temporary loss of revenue would seriously impair Ace's ability to restart the FERC contract and would also impair Ace's ability to provide support services to other clients. Monick Affidavit ¶ 13(b). This point is dubious at best. When Ace first commenced providing stenographic services to the FERC, it was clearly able to utilize sufficient resources to provide the FERC with stenographic services. Certainly, it can muster these same resources to start the contract again if necessary. Finally, Mr. Monick alleges that Ace will lose the opportunity to earn additional revenues derived from the many law firms and companies that participate in FERC proceedings. Monick Affidavit ¶ 13(c). Once again, the alleged anticipated losses are merely speculative and not quantified in any way.

C. The Harm to Other Interested Parties Outweighs the Harm Ace Alleges.

On February 12, 1990, the FERC awarded this contract by lottery to another bidder, Ann Riley, which had submitted a responsive bid to the Second Solicitation. If the FERC is enjoined from allowing Ann Riley to perform under the contract, Ann Riley will clearly be harmed. After successfully competing in the government procurement process, it will unfairly be prohibited from performing under the contract. Clearly, the anticipated profits that Ace allegedly fears losing are the same profits that Ann Riley can expect to lose if a preliminary injunction is ordered.

D. The Public Interest Favors Denying Ace's Request for a Preliminary Injunction.

As the D.C. Circuit held in M. Steinthal & Co., a reviewing court should take into account the "strong public interest in avoiding disruptions in procurement." *M. Steinthal*, 455 F.2d at 1300. For this reason, judicial interjection should be withheld "unless it clearly appears that the case calls for an assertion of an overriding public interest 'in having agencies follow the regulations which control government contracting.'" *M. Steinthal*, 455 F.2d at 1300, *quoting* *Scanwell Laboratories, Inc. v. Shaffer*, 424 F.2d 859, 864 (D.C. Cir. 1970). "The balancing of the public interest in free and fair competitive bidding against both the fairness to the parties and the Government's contractual needs requires informed judgments by officials continuously faced with such decision, not by the courts which are unfamiliar with, and ill-equipped to handle, problems couched in these procurement policy terms." *M. Steinthall*, 455 F.2d at 1304.

In this case, there is a clear public interest for the government procurement process to proceed with expedition. The existing contract for stenographic services which are vital to the agency's ability to perform its regulatory mission was originally scheduled to expire on September 30, 1989. As a result of Ace's first unsuccessful protest to the GAO and its second protest to the GAO which is currently pending, the FERC has been forced to extend Ace's contract through February 28, 1990. Since it is the incumbent contractor, Ace clearly benefits from protracted litigation. At this point, it is in the public interest for the FERC procurement process to go forward.

Ann Riley properly submitted a responsive bid to the Second Solicitation and was awarded the contract. It is entitled to perform the stenographic services for the FERC commencing on March 1, 1990. "It would be intolerable for any frustrated bidder to render uncertain for a prolonged period of time government contracts which are vital to the functions performed by the sovereign." M. Steinthal & Co., 455 F.2d at 1303.

E. Ace Lacks Clean Hands in Seeking Equitable Relief.

Ace's conduct in this litigation clearly demonstrates that it does not have clean hands. As described above, Ace has taken the position in written pleadings filed before the GAO that the FERC did not have the authority to exclude bonus bids and alternate bids. It took this position on December 29, 1989 -- 7 days after the FERC's second amendment. Ace cannot deny that it construed the language of the Second Solicitation, as amended, to prohibit bonus bids. If it later gave the same langauge in the Second Solicitation another interpretation, it must have believed that this language was ambiguous. At any time from December 29, 1989 until bid opening on February 5, 1990, it could have brought this possible ambiguity to the attention of the CO and sought guidance on this point. As one court has held, "no party has the right thus to create problems by its devious and deceitful conduct and then approach a court of equity with a plea that the pretended status which it has foisted on the public be ignored and its rights be declared as if it had acted in good faith throughout." New York Football Giants, Inc. v. Los Angeles

Chargers Football Club, Inc., 291 F.2d 471, 474 (5th Cir. 1961).

Conclusion

For the foregoing reasons, summary judgment should be granted in favor of defendant because it is entitled to judgment as a matter of law and there are no genuine issues of material fact. In addition, this Court should deny Plaintiff's Motion For a Temporary Restraining Order or a Preliminary Injunction because it has failed to make the requisite showing for injunctive relief.

Respectfully submitted,

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

ACE-FEDERAL REPORTERS, INC., Plaintiff, v. FEDERAL ENERGY REGULATORY COMMISSION, et al., Defendants.	Civil Action No. 90-0287 JGP

O R D E R

UPON CONSIDERATION OF plaintiff's Motion for Temporary Restraining Order and for Preliminary Injunction, defendant Federal Energy Regulatory Commission's opposition thereto and Motion for Summary Judgment, and it appearing that no genuine issue of fact remains to be decided in this action, it is this _________ day of February, 1990

ORDERED that plaintiff's Motion for Temporary Restraining Order and Preliminary Injunction is denied, and it is

FURTHER ORDERED that the Federal Energy Regulatory Commission's Motion for Summary Judgment is granted, and it is

FURTHER ORDERED that this action is dismissed with prejudice.

UNITED STATES DISTRICT JUDGE

Copies to:

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that copies of the foregoing Motion for Summary Judgment, Declarations of James E. Thompson and Charlotte Greenwell, Statement of Material Facts As To Which There Is No Genuine Issue, Memorandum of Points and Authorities in Support of Federal Energy Regulatory Commission's Motion for Summary Judgment and in Opposition to Plaintiff's Motion for Temporary Restraining Order and for Preliminary Injunction, Exhibits in Support of Memorandum, and Proposed Order are being hand delivered the 23rd day of February, 1990, to counsel for plaintiff, Ronald K. Henry, Esquire, Baker & Botts, 555 13th Street, N.W., Suite 500 East Washington, D.C. 20004; and to counsel for codefendant, John G. DeGooyer, Esquire, Hopkins & Sutter, 888 Sixteenth Street, N.W. Suite 700, Washington, D.C. 20006.

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Mr. FAZIO. How did it get to a court?

Mr. SCHERMAN. Ace sought an injunction and has received a preliminary injunction.

The judge has essentially ordered a stand-still and status quo pending a decision on the merits which we expect in the next several weeks.

As to the second element of your question, as a general matter, the statement that was made by one of the Commission's contracting employees concerning where these funds would go to, I believe, has been retracted.

It is not the position of Chairman Allday or the Commission. It was an unfortunate misstatement.

It did not contribute in any way to the decision that the contracting officer made at the time.

Chairman Allday is very fond of saying, Mr. Chairman, that we all work for the same government, so I don't think that this was a contributing factor to the decision.

As to whether we should do those services on our own, historically those services have been rendered to the Commission on a no-cost-to-the-Government basis.

It would cost us a fair amount of both money and staff personnel to provide those services directly.

That is why we have not for many years eliminated the middleman, if you will.

Mr. FAZIO. Are you sure that you couldn't derive an increase in your revenues out of performing this task yourself?

Do you now what it would cost to replace them in-house?

Mr. SCHERMAN. Not offhand.

I will see if we can get that information.

[The information follows:]

IN-HOUSE STENOGRAPHIC REPORTING SERVICE COSTS

Based on the number of hearings and settlement conferences and the annual volume of transcript pages produced during the past three fiscal years (FY 1987 through FY 1989), we estimate that it would cost $1 to $2 million in startup costs and then between $2 to $3 million annually to provide the same service we now receive from the contractor.

Startup would include such costs as purchase of specialized transcription equipment, transcription supplies, furniture, some training for in-house staff, and modifications to our current office layout to accommodate a stenographic reporting staff.

Annual operating expenses would include salaries and benefits for approximately 25 people (11 court reporters, 10 transcribers and proofreaders, and 4 support staff), overhead, equipment maintenance, training, printing and duplicating supplies, and overtime costs associated with overnight service for next day use.

Mr. SCHERMAN. I assume that the private enterprises derive some profit from it, but I think it would entail a fair amount of start-up costs and permanent personnel costs year after year.

Mr. FAZIO. We are assuming that you could make a million and a quarter if Ace thinks they can.

The real question is what would it cost you to make that money?

You have to subtract those costs from that figure, I guess.

We don't know what that would entail.

Mr. SCHERMAN. We could make an estimate.

One of the things we have been trying to get from Ace is exactly the type of services they provide, because we don't know what their operating costs are either.

[The information follows:]

CONTRACTOR STENOGRAPHIC REPORTING SERVICE COSTS

The Commission's position is that we would sell the transcripts for cost only and, as such, not generate what would be excess revenue. This position is based on the fact that under current statutes with regard to our annual charges and fee structure, we are allowed to recover only the Government's full cost of operations to provide the service. This includes our annual operating budget and additional unfunded retirement costs in accordance with OMB guidance.

Under this scenario, if court reporting services were performed in-house, we would be required to charge a price for the transcripts that is substantially lower than the price charged commercially by the current contractor so as to only recover our operating costs and not generate a profit like the contractor does.

In addition, OMB Circular A-76, entitled "Performance of Commercial Activities," defines Federal policy to be reliance on commercially available sources for commercial products and services if this is the most economical method. According to OMB Circular A-76:

"In the process of governing, the Government should not compete with its citizens. The competitive enterprise system, characterized by individual freedom and initiative, is the primary source of national economic strength. In recognition of this principle, it has been and continues to be the general policy of the Government to rely on commercial sources to supply the products and services the Government needs."

Mr. FAZIO. Even though there may be some philosophical problem with taking work away from private enterprise, you are paid for by the people who are served by the Commission, so anything you could do to reduce that amount of money, would be generally appreciated.

JUDICIAL REVIEW OF FERC DECISIONS

Let's go on to other areas of inquiry.

I understand the record of reversals and remands of FERC decisions by the courts has increased.

What are you doing to ensure that current FERC actions will better survive judicial review in the future?

That is an area of your specialization.

Mr. SCHERMAN. I tried to address that a little bit in my statement.

Chairman Allday has announced that one of his highest priorities is to develop and restore some of the credibility of the Commission with the courts.

You might be interested to know that in FY 1989, the Commission won outright almost 80 percent of its cases.

So far in FY 1990, we are winning about at the same rate.

Unfortunately, the cases that we have lost lately tend to be some of the more major initiatives of the Commission.

I think what has happened is that as the Commission over the last several years has sought to interject competition into previously heavily regulated industries.

There have been transition issues that are inherent in any industry that goes from heavy- to light-handed regulation.

By the same token, one of our major initiatives is Order No. 451.

Although the Fifth Circuit reversed us, we are pursuing certiorari with the Supreme Court.

A petition was filed last Friday by the Solicitor General on our behalf.

We are optimistic about the outcome and that the Fifth Circuit decision will be reversed.

Mr. **Fazio**. So really what you are trying to do is a better job. That is the answer you gave us?

Mr. **Scherman**. We are trying to explain our rationale and our thinking in a more cogent and clear way, utilize all the expertise of all the people in the agency and explain to the courts in a way acceptable to them what we are doing and why, and what the consumer benefits are.

ENVIRONMENTAL REVIEW OF NORTHEAST PIPELINE PROPOSALS

Mr. **Fazio**. We have had the subject of natural gas pipelines in New England before the committee before. In fact, and we have fought these issues out in very difficult continuing resolution, where no one could really get to the crux of the matter.

Could you tell me why we have had such a lengthy time for FERC review of environmental concerns on the proposed natural gas pipeline projects in New England and indicate to us the principal problems associated with increasing the importation of natural gas to New England?

Mr. **Scherman**. This has been the subject of ongoing concern by the Commission for about ten years, and it mainly stems from the fact that under NEPA and other environmental laws, the Commission is required to develop records and consider environmental impacts of major pipeline certification projects.

Many of these pipelines seek to go through densely populated areas where there is a lot of local and State concern over the placing and sighting of the facilities.

In certain instances, the Commission is required by statute to hold local and scoping sessions to hear the concerns of the local communities to evaluate all the environmental impacts.

In the Northeast situation, the environmental review has been the pacing element.

We have tried to request sufficient budgetary authority to go out and assist our own environmental staff by using contractors that are preparing environmental analyses for our review.

We are trying to facilitate the environmental review. We have issued about 18 orders, I think, to expand service in New England. We have some more pending.

We hope to complete environmental reviews on those this year so that we can move forward on the certification hopefully by the end of the year.

Mr. **Fazio**. You indicated in your statement that you are asking for $8.7 million for environmental reviews which is an increase of $3.1 million over last year.

Is that sufficient?

There are other questions that I will ask either at the hearing or for the record relating to the same kinds of delays in the regulatory process.

Are you asking for enough to get through these environmental laws and regulations that you have to work with?

Mr. SCHERMAN. I think we are.

A lot of the work for the Northeast is already in the pipeline, so to speak. Work is underway.

The 1990 budget appropriation that we were given has started a great deal of it.

So I think we will have enough money to complete, in a timely way, all the certification process.

Mr. FAZIO. How much are you doing in-house and how much are you contracting out?

Mr. SCHERMAN. Most of that $8.7 million is contracting money. We have an environmental staff so that some part of our general administrative and support dollars are associated with the staffing and support for that.

I don't know the breakdown off the top of my head.

[The information follows:]

BREAKDOWN OF ENVIRONMENTAL REVIEW BUDGET

[Dollar amounts in millions]

	Fiscal year—	
	1990	1991
Full-time equivalent (FET) staffing	83	83
Contractual funding	$5.6	$8.7
In-house costs for salaries, benefits, travel, training, and administrative support	5.8	6.0
Total	11.4	14.7

Mr. FAZIO. Do you see a change in the future or is this going to be an ever-increasing area of the Commission's budget request?

Mr. SCHERMAN. I think we are likely in the next several years to see a continuing increase in both hydro review and pipeline certification review.

I think we will see that for the next several years and then I think it will begin to trail off.

Mr. FAZIO. I have more questions, but at this time, I yield to Mr. Myers.

Mr. MYERS. Mrs. Smith is required in another committee, so I would yield to her.

Mrs. SMITH of Nebraska. Thank you, Mr. Myers and Mr. Chairman.

Mr. Chairman, I want to tell you that I asked Mr. Whitten to release me from the Agriculture Committee.

We are having a very important hearing there on Federal crop insurance, but I told him that in 49 years of Federal crop insurance in my district, and it is the second-most agricultural district in the Nation, that has never caused me as much trouble as FERC is causing me right now and that I should be here where I hope I have a chance to get some answers to the questions.

KINGSLEY DAM PROJECT

Let me say to you that my people are really up in arms because of abuses as they perceive it in your operation of FERC.

I don't mean you personally, but I mean all of you.

Mr. Chairman, these are just the letters that came in this morning from there. Let me read from two or three letters.

> It is my understanding that it is the intent of FERC to lower the water table of Lake McConaughy in order to establish a wetland area for sandhill cranes 200 miles downstream. What I do not understand is why anyone would destroy an existing wildlife area to create a new one.
>
> At the west end of Lake McConaughy, we have a bald eagle population of over 100 birds. We have sandhill cranes, otters, and large numbers of ducks and geese.
>
> I ask FERC to reconsider this decision.

Another one says,

> I do not believe it is reasonable or right to destroy existing habitat area in order to enhance another downstream. I feel there is just cause for an immediate rehearing.

And here they go on to say the same thing:

> As you know, farmers are very protective of our wildlife and after all we are the ones who pay the most taxes in Nebraska.
>
> If they ruin this area, the property will not be of any value and the taxes will go down and it will destitute the area.
>
> Please try to get those lunkheads to do something about it.

Now, let me say——

Mr. MYERS. Is that your comment or the letter; the lunkheads?

Mrs. SMITH of Nebraska. That is in the letter. I am reserving my own personal judgment.

Mr. MYERS. I thought you had softened your stance somewhat.

Mrs. SMITH of Nebraska. But I cannot understand the mismanagement in handling this. You know, we made this application in 1987.

The costs of trying to get our project relicensed are now close to $10 million according to its managers and all that FERC has done is issue what I would regard as a highly questionable interim license filled with conditions that are not authorized in the law, and it is now 1990.

I noted, as you were speaking with our fine chairman, Mr. Fazio, that you say you have enough money to complete in a timely way all certification.

Evidently you don't have enough interest or enough money or enough something to get the relicensing issued in a timely fashion.

How much longer is it going to take to issue a new long-term license?

Mr. SCHERMAN. Let me just start by saying that if you like, I will take copies of those letters and place them in the record along with the regular rehearing petitions.

Mrs. SMITH of Nebraska. Would you like all I have?

We will have to have another volume for this session if we do.

Mr. SCHERMAN. We will be happy to read them.

This project is currently pending rehearing at the Commission and we will be evaluating all the issues raised in the rehearing, and if you would give me copies of those letters, we will look at them as well.

The project that you refer to has been one of the most controversial at the Commission in a number of years.

It started in 1984. It has been ongoing for quite a while.

In 1986, it was determined by both State and Federal resource agencies that a joint study of the entire system and river area where these projects are located needed to be studied.

That was a joint Federal-State decision.

That study has been one of the main reasons we are now on the annual license as opposed to looking at the long-term permanent license.

We expect that study to be done this spring, hopefully in May, and then we will be in a better position to determine when we can move forward on the permanent license.

It may be that a new permanent license will be filed this May and we can move forward.

The other consideration is that the interim conditions that the Commission just imposed were in response to a court decision where the D.C. Circuit told the Commission that on an interim basis for the annual license it had to consider so-called "rough-and-ready" environmental measures to mitigate environmental impacts.

The conditions that your constituents are complaining about were in response to that court directive. That order was issued about a month ago and we will be looking at that on rehearing.

Mrs. SMITH of Nebraska. It was issued February 14.

Are you going to have a rehearing?

Mr. SCHERMAN. Yes, ma'am, we will.

Mrs. SMITH of Nebraska. At an early date?

Mr. SCHERMAN. Yes, ma'am, we will.

Mrs. SMITH of Nebraska. Could you give me a date?

Mr. SCHERMAN. I expect within the next 60 to 90 days.

Mrs. SMITH of Nebraska. The present law, Section 15—I don't know how FERC can impose these new restrictions under the current law.

The law says "The Commission shall issue from year to year an annual license to the then-licensee under the terms and conditions of the existing license."

Mr. SCHERMAN. In these two particular cases—and again I suspect that this will be an issue on rehearing so I need to be rather careful not to prejudge this issue—in this particular instance, in one of the licenses involved, there was a specific reservation by the Commission of the authority to impose these types of conditions.

As to the other license, there was not, and we have asked the licensee to voluntarily submit to these conditions.

So I believe that the Commission's decisions comport with the provision you just cited.

HYDRO LICENSING PROCESS

Mrs. SMITH of Nebraska. Now I am not really asking you about this specific case. I brought this up to Admiral Watkins and he says your relicensing procedure is a mess, that it is a mess in our case and that it is a mess all across the board.

How could we change the law to make it so that it is handled in a more acceptable fashion across the country?

Mr. SCHERMAN. Several months ago, we were asked by the Senate Energy and Natural Resources Committee to make those types of recommendations as to what statutory changes might be in order to streamline the Commission's processing of hydro applications.

We hope to provide that to the Senate Energy Commission in the next several weeks or another month, and I would be happy to share that with this committee as well.

The fundamental issue, though, is the extent to which the Commission is required by various laws to consider both environmental and non-environmental issues in its licensing process.

The Commission, under ECPA, a 1986 law, is required to give equal consideration to developmental and non-developmental issues in licensing.

We must develop sufficient record upon which to make these determinations. That takes time, and it also takes a fair amount of money.

But that is what we are required to do under the law in order to fulfill our statutory responsibilities.

Mrs. SMITH of Nebraska. How many hydroelectric facilities in the United States are required to have Federal licenses?

Mr. SCHERMAN. I am told about 1,700 are under license.

Mrs. SMITH of Nebraska. How many of them are expiring? In other words, what is your caseload now?

Mr SCHERMAN. We expect that in 1992 we will have about 170 relicensing applications and about 195 roughly in the next 4 years.

Mrs. SMITH of Nebraska. What is the typical length of time it takes for a hydroelectric facility to receive a new long-term license?

Mr. SCHERMAN. I will get you a specific average for the record, Mrs. Smith.

It is based upon the location of the project, the complexities involved, the types of studies that are required in order to fulfill the different statutory concerns.

So it depends upon the nature of the project.

[The information follows:]

RELICENSE PROCESSING TIME

Between January 1, 1987, and January 5, 1990, 38 relicenses were granted. The average processing time for these applications, from filing date of the application to issuance date of the new license, was 2.8 years.

Mrs. SMITH of Nebraska. What terms are typical for new licenses?

Mr. SCHERMAN. The new law enables us to relicense between 30 and 50 years. Most of the older licenses were done for 50 years.

PUBLIC PARTICIPATION

Mrs. SMITH of Nebraska. Another subject—another very serious problem with you imposing these interim conditions is the lack of notice and due process to other parties affected by these conditions.

For example, there could be other water users such as irrigators or municipalities who rely on a project for water supply.

There are people who fish and boat on the river. There are many people who would be adversely affected by conditions requiring an increased downstream flow.

What opportunities have you provided for those potentially affected persons to participate in the business of setting interim conditions?

Mr. **Scherman**. As part of the Commission's relicensing efforts, we are trying to establish procedures for both pre-filing notification and notification of licensing filings for all interested parties.

We have recently issued a notice of proposed rulemaking on what we call 10(j) of ECPA that deals with consultation with State and Federal resource agencies.

We have also issued relicensing regulations that are designed to give people notification about how these licenses will be processed.

There is usually ample opportunity on notice to local and State concerns about scoping sessions and meetings.

The Commission has an outreach program where our hydro folks travel the country to talk about these issues.

Local notice is required in local newspapers.

Mrs. **Smith** of Nebraska. How about all of the people that have had this done to them by this February 14 announcement. They didn't have this opportunity.

You have been talking about what you are going to do to make it better.

What are you going to do to give a fair break to these people upon whom you are trying to put this burden?

Can I go home and tell them that none of this will be activated until you have had the rehearing?

Mr. **Scherman**. I am afraid you can't.

We try to be sensitive to local concerns. This project has been under study for quite a while.

We specifically looked at in these orders the minimum flow conditions to ensure that these impacts would not occur.

We will look at that on rehearing.

This project has been the study of innumerable Commission staff hours and we will do everything we can to be responsive to those questions on rehearing.

Mrs. **Smith** of Nebraska. This order could have irreversible effects on the people of that area, on the environment, on the economy of the area.

I think this is entirely out of order. You haven't said anything to me that can make me understand that you have authority to put this kind of a burden on people, and if I can't get better answers, I am going to ask for a GAO investigation and if GAO isn't the proper agency to investigate, I am going to see what else we can do to try to shape up the operation of FERC.

No more questions, Mr. Chairman.

Mr. **Fazio**. Thank you, Mrs. Smith.

John?

Mr. **Myers**. I have several questions I will provide for the record, Mr. Chairman.

Mr. **Myers**. Just a couple of general questions, Mr. Scherman.

Please extend our best wishes for a quick recovery to Mr. Allday. Is he still in the hospital?

Mr. **Scherman**. He is. He will be there for several more days.

Mr. **Myers**. Must have been serious surgery.

In your statement, you say that FERC is committed to restoring competition, which I think has been long overdue.

Today, may a utility go on the open market and sell power below regulated prices if they have a surplus?

Mr. SCHERMAN. They would need, assuming the transaction was jurisdictional, they would need authority from the FERC to do so.

The FERC has pending before it an application where a utility would seek to do that.

The Commission has received evidence from the parties and the utility in a paper evidentiary hearing, which we expect to act on in the next month or two, as to whether a utility can do what you said.

That is the Public Service Company of Indiana.

Mr. MYERS. If they want to sell below the contract price, does that disturb existing contracts or does the buying utility have to buy first from their contract?

Mr. SCHERMAN. I am not sure I follow.

Mr. MYERS. Aren't there contracts today where utilities have to buy a certain amount of power from another company?

Mr. SCHERMAN. Yes.

Mr. MYERS. What happens to those if you go on the open market and underbid them?

Mr. SCHERMAN. Speaking generically, since I can't talk about the specifics of the PSI case——

Mr. MYERS. We are just talking now about contract responsibility.

Mr. SCHERMAN. There should be no contract abrogation as a result of this type of authorization.

One of the things inherent in a competitive market is that the price will end up determining the decisions of certain buyers.

In this instance, you have got a utility that has surplus power seeking to sell it at market-based rates.

There is no reason that other utilities in the same situation can't seek to apply to the Commission for that same type of authorization.

There is also no reason that other utilities should have their contracts abrogated as a result of that decision.

Mr. MYERS. Last December, the country was hit with a cold snap almost nationwide that caused disruption in electric power and shortages of LP, natural gas, oil, and fuel oil.

With regard to electricity, was there much wheeling of power around the country during that period?

Mr. SCHERMAN. I am sure there was; yes.

Mr. MYERS. You don't keep any records on that?

Mr. SCHERMAN. I will check.

I don't think we do. We have a number of agreements on file between different regional planning pools that enable them to wheel power on a voluntary basis across their systems.

I don't know what the reporting requirements are, if any, under that.

I will check.

We have heard from various utilities that there was power being generated as far away as North Dakota being sold into the Northeast and various other places, so I am sure there was.

[The information follows:]

Reporting Requirements for Wheeling Transactions

Mr. **Scherman**. I have verified that there are no special reporting requirements for wheeling transactions. Transactions, such as those that occurred last December, are conducted under transmission tariffs previously filed with the Commission. These transactions are reported in summary form in the annual summary of transmission transactions as part of the annual Form 1 submittal, which is filed with the Commission by every jurisdictional utility on or before April 30 of each year. It should be noted that "emergency" transactions can also occur as a series of buy-sell arrangements, in lieu fo wheeling, in which case they may also be reported as "sales-for-resale" or "interchange" transactions which are also part of that Form 1 report submittal.

ELECTRIC POWER SHORTAGES

Mr. **Myers**. Has FERC seen any responsibility to examine what happened. Do you have responsibilities in that area as far as brown-outs and black-outs?

Mr. **Scherman**. We don't have any direct statutory responsibility over that.

The Energy Information Administration of DOE looks at supply and demand more than we do.

Having said that, Chairman Allday is very much concerned about the growing recognition on both the gas and electric side that supply may be a problem down the road.

That is not to say we are in a crisis now, but we saw in December a situation where you had cold weather in supply areas, cold weather in market areas and you had a tremendous demand placed upon both the gas and electric systems.

Chairman Allday has recently announced in conjunction with DOE, for example, that the Commission and DOE will do a deliverability study on natural gas.

By fostering competition in the electric markets, we hope to partially address that problem by making an environment that is more hospitable for non-traditional utility generators, so-called independent power producers, which Chairman Allday believes can help provide some of the energy we will need in the future.

Mr. **Myers**. I have a series of other questions I will provide for the record.

NATURAL GAS SERVICE TO CALIFORNIA

Mr. **Fazio**. Thank you, Mr. Myers.

What is the status of your review of the proposed natural gas pipeline to bring natural gas from Wyoming to California to provide for enhanced oil recovery?

Mr. **Scherman**. We have currently issued to both Wyoming-California Pipeline Company and Kern River Pipeline Company, in WyCal's situation, two certificates, in Kern River's one, to bring natural gas to those areas.

We have issued a certificate to Mojave Pipeline Company that will serve the same markets, but from a different supply area.

We have pending other applications that seek to serve the California market.

WyCal, Kern River, and Mojave are currently pending rehearing before the Commission.

The PGT and Altamont applications are being processed.

Mr. FAZIO. I understand you have issued optional certificates in which three of the five outstanding pipeline applications for California can proceed?

Mr. SCHERMAN. They are pending rehearing, but there are mitigation conditions in both that WyCal and Mojave and Kern must comply with before construction can begin, but they are further along than the other two.

Mr. FAZIO. The other two are——

Mr. SCHERMAN. PGT and Altamont.

Mr. FAZIO. Do you expect the other two to catch up with the other three?

Mr. SCHERMAN. We are currently undertaking the environmental review process for those two.

We expect draft EIS's to be done sometime this summer, the final EIS's by the end of the year so that those two projects can move forward at the end of the year.

Mr. FAZIO. I commend the Commission for its action, but I am also mindful that the certification process for these pipelines has taken up to three years, and furthermore, certification of the projects doesn't fully address the situation in California.

The supply sources of these certified pipelines are not adequate to meet all the long-term needs that the California gas consumption community will need.

The fact is that transportation from other reliable North American sources must be included as part of a pipeline solution for California.

I think you are aware that 32 Members of our delegation wrote to Chairman Allday urging that he take the necessary steps to assure that the certification process be completed during the calendar year, and we are hopeful and optimistic that that can be met.

Does the Commission expect that it can comply with the request; and if not, what are the obstacles to completing these applications in a timely manner?

Are your staff resources inadequate to permit you to meet the schedule, for example?

Mr. SCHERMAN. No, sir. I don't think they are. I think they are adequate.

In both the situations of PGT and Altamont, the Altamont application is partially incomplete and we have asked them for more information.

We have also asked for more information from PGT. We may be needing some more information in the future.

Assuming that we get the information we need, again we should be in the ballpark for the end of the year, roughly the end of the year.

Mr. FAZIO. We have had three successive years where large gas customers in California are experiencing curtailments. I just hope that the message is clearly getting across that our industrial and utility customers have already experienced problems this winter, and it is a desperate situation.

Increasingly we are just unable to comply with Federal-State air quality standards if we are not able to obtain the product that you regulate so tightly.

We have got to move to cleaner fuels, and you control one of our few avenues of opportunity.

I guess for the record, I can include some other comments as well as questions, but I appreciate the interest that you have shown recently in moving forward on this.

IMPACT OF WELLHEAD GAS DECONTROL

Mr. Fazio. The Natural Gas Wellhead Decontrol Act of 1989 will deregulate all natural gas prices at the wellhead by January 1, 1993.

Could you describe the impact that this legislation is going to have on FERC and the natural gas industry?

Mr. Scherman. On the natural gas industry, it will likely complete the transition to a competitive wellhead market for the commodity of natural gas.

As to the Commission, a large part of the natural gas was deregulated in 1985; more was deregulated in 1987.

The Commission has already begun to see the workload in the areas associated with wellhead regulation diminish.

We have begun shifting personnel from those areas into other areas like environmental review for pipeline certification.

I think you will see that continue over the next several years.

As to the market itself, it is in many respects a competitive market at the wellhead and we are focusing our efforts on making the delivery system as competitive as possible so that people in California and elsewhere have a greater opportunity and more options to buy gas on competitive levels.

DAM SAFETY AND INSPECTION

Mr. Fazio. Would you indicate what the Commission's program for dam inspection and dam safety is?

There are other agencies related to this and I would like to know the interrelationship between the Bureau and the Corps particularly.

Mr. Scherman. We make 1,200 to 1,500 inspections every year of hydroelectric facilities.

Mr. Fazio. What are you looking for when you go out to a hydroelectric facility that is different than other agencies?

Mr. Scherman. We look mainly at safety issues and environmental concerns.

Depending upon what conditions we have placed in the license, it could be a whole host of things.

Mr. Fazio. You are basically looking for compliance with your license?

Mr. Scherman. Yes, we are.

Mr. Fazio. I would think that there might be some duplication here between various agencies.

Mr. **Scherman**. I think it depends largely on the nature of the facility in question.

We look at—the Corps and other folks look at different facilities depending on whether it is a Corps dam or a Corps facility and we tend not to look at those.

Mr. **Fazio**. For example, there may be something built by the Bureau which you have licensed for hydro.

Mr. **Scherman**. I think in those instances they may be doing the inspection rather than us, but I will have to check.

Mr. **Fazio**. You would think only one agency is doing inspection at each facility.

Mr. **Scherman**. Yes, sir.

Mr. **Fazio**. You are each aware of the other agency's responsibilities?

Mr. **Scherman**. We try to be; yes, sir.

Mr. **Fazio**. For the record, provide information on how the interrelationship works between other agencies of the Government that have similar responsibility.

Mr. **Scherman**. Yes, sir.

[The information follows:]

Coordination of Dam Safety Inspections

Non-federally owned dams that are licensed by the Commission are under the Commission's dam safety responsibility and are inspected by the Commissions staff. Licensed dams are not inspected by other federal agencies. The Commission has no jurisdiction over federal dams, but is authorized to license non-federal power plants at Federal dams, usually constructed by the Bureau of Reclamation (BOR) or the Corps of Engineers (Corps).

Federal dams were constructed for congressionally-authorized purposes, generally for irrigation, flood control, water supply and navigation interests. There is no duplication on the inspection of Federal dams. The dam safety responsibility rests solely with the Federal agency that owns the dam, usually the BOR or Corps. However, Commission staff does inspect the licensed project works located at federal dams. The licensed project works would exclude the federal dam.

In order to ensure cooperation and recognize the responsibilities of the BOR and the Corps, the Commission has entered into memoranda of understanding (MOU's) with both agencies. The MOU's were entered into to ensure the integrity of the Federal interests, avoid duplicative efforts, and to implement procedures for BOR and Corps input to the licensing process. Basically, the MOU's are designed to ensure that a licensed power plant at a government dam will not interfere with the operation, maintenance, or safety of the Federal project.

Mr. **Fazio**. Any other questions?

Thank you for your pinch-hitting for Mr. Allday and we appreciate the responsiveness with which you have submitted your testimony.

Other members of the committee or other Members of Congress will have questions for the record.

Thank you very much.

The hearing is adjourned.

[The prepared statement of Mr. Scherman, and questions and answers for the record follow:]

Prepared Testimony of William S. Scherman, General Counsel
Federal Energy Regulatory Commission
Before the Subcommittee on Energy and Water Development
Committee on Appropriations
U.S. House of Representatives
March 19, 1990

Mr. Chairman and Members of the Subcommittee, my name is Bill Scherman, and I am General Counsel of the Federal Energy Regulatory Commission (FERC). I am honored to be here today to present the Commission's fiscal year 1991 budget request on behalf of Chairman Martin L. Allday, who is unable to appear here today as a result of surgery late last week.

As you know, Chairman Allday has been on the job for fewer than four months. Therefore, I would like to outline what his overall objectives will be during his tenure as FERC Chairman. As a general operating principle, Chairman Allday will be looking for additional ways to allow competition to operate in the industries FERC regulates. Chairman Allday believes that, where appropriate, competitive markets are the surest and quickest way to achieve balance between supply and demand, risk and reward. While competition may not be sufficient in all situations, we will allow markets to operate where sufficient competition exists and take appropriate steps to foster competition in those markets where sufficient competition is not present.

LEGAL CONCERNS AND STABILITY

At the same time, one of Chairman Allday's top priorities is to strengthen the legal underpinning of the Commission's orders and opinions. By reinforcing the legal foundation of our decisions, we intend to provide some much needed stability for the industries we regulate.

Chairman Allday is committed to turning out a first-rate legal product. As General Counsel, I will do all that I can to ensure that this commitment is put into practice. We will strive to ensure that the Commission's orders comport with our statutory mandate to protect the public interest, and that they are well-reasoned and within the scope of the Commission's authority.

Because investment decisions may hinge on the Commission's decisions, we want to establish the kind of stability you can take to the bank. This means that everyone -- industry, government, and the consumer -- needs to know what is expected of them. I don't suggest that this is an easy task, but it is one that is important to all, and Chairman Allday intends to make this an important feature of his agenda.

PAPERWORK

Under Chairman Allday's direction, we will also be taking a look at the Commission's paper processes and what we require of the regulated industries. We'd like to make dealing with FERC less formidable and more efficient.

COOPERATION WITH THE STATES

Another long-term objective is to work more closely with the States. Chairman Allday believes that the founding fathers envisioned a cooperative relationship between the federal government and the states. He intends to honor that vision wherever possible.

ENERGY SUPPLY

Finally, Chairman Allday has emphasized his conviction that we must begin to think seriously today about our energy future and where our future supplies will come from. Over Christmas weekend, the Commission's staff monitored the natural gas and electric supply situations that arose from the widespread extremely cold weather. Fortunately, only a few customers experienced curtailed gas supply, but some utilities were forced to institute rolling blackouts, in some cases for the first time ever. And while we had an unusual confluence of extremely cold weather in both the supply and market areas, these are warnings we cannot afford to ignore.

Regulation should not be a barrier to the discovery and recovery of new energy sources. Rather, it should promote the acquisition of resources at just and reasonable prices, taking into account environmental and national security concerns.

FY BUDGET REQUEST

Now, within the context of the objectives I've just outlined, let me turn to the FERC's FY 1991 budget request which, if approved by Congress, will be a major step toward allowing FERC to achieve these objectives.

The Commission is requesting $122.75 million and 1,570 full-time equivalent (FTE) staff years for the fiscal year beginning on October 1, 1990. This request represents an increase of approximately $7.8 million over the Commission's FY 1990 appropriation, taking into account the $1.6 million sequestration pursuant to the Gramm-Rudman Deficit Reduction Act. The Commission's FY 1991 budget request involves no new programs or staffing increases.

The requested increase is essentially composed of four elements: the 1991 effect of the January 1990 pay raise and related costs totalling $2.6 million; an additional $3.1 million to support growth in environmental work associated with the timely processing of hydropower licensing matters and applications for certificates for new pipeline capacity; an increase of $1.3 million for improved automation of workload processing activities; and another $0.8 million to cover remaining fixed cost increases to basic program support services such as space rental, telecommunications, and printing.

ENVIRONMENTAL REVIEWS

The Commission's budget request includes $8.7 million to support our environmental activities in FY 1991, an increase of $3.1 million over the level provided for that purpose in FY 1990. Of this amount, $4.6 million will be used for environmental requirements related to the natural gas pipeline certification process. The remaining $4.1 million will be used to address the hydropower program's environmental review requirements, including efforts associated with relicensing activities.

At this time I would like to summarize the four programs for which the Commission is requesting funding in FY 1991.

NATURAL GAS REGULATION

We are requesting $57.3 million for natural gas regulation in the next fiscal year. Our program in FY 1991 will continue efforts to remove or reduce regulatory restrictions in competitive gas markets, to respond to Court decisions affecting the Commission's transportation and pricing programs, and to play a growing role in helping to meet our country's long-term energy needs in an efficient and environmentally sound manner. We will also sustain our commitment to modernized administration through continued implementation of automated filing requirements and the application of computer technology to staff review and analysis.

The Natural Gas Wellhead Decontrol Act of 1989 will deregulate all natural gas prices at the wellhead by January 1, 1993. During this period of transition, we are shifting personnel and resources from workload categories in the area of producer regulation to high impact workload areas such as pipeline certification. We will continue to give priority to processing applications to serve new markets and develop new capacity -- particularly in the Northeast, Pacific Northwest, California, and Mobile Bay -- and we will undertake major environmental reviews required in association with such new pipelines.

HYDROPOWER REGULATION

Our request for activities in the area of hydropower regulation is for $35.8 million. These funds will support processing of license applications proposing new generating capacity, which may require major environmental reviews, and enable the Commission to prepare for the large influx of approximately 170 relicensing applications which are scheduled to be filed in the first three months following the end of FY 1991. We intend to maintain strong compliance, enforcement, and dam inspection safety programs and plan to conduct full-scale evaluations to assess the structural integrity of more than 200 major projects.

The Commission will also continue to expedite the processing of applications for preliminary permits, exemptions and new capacity licenses, consistent with safety and environmental considerations.

ELECTRIC POWER REGULATION

The $26.5 million requested for regulation of electric power in FY 1991 will be used to support the Commission's responsibility to regulate rates for the transmission and sale for resale of electric power in interstate commerce, to review the rates charged by the Federal power marketing administrations, and to administer the qualifying facilities program under the Public Utility Regulatory Policies Act.

Chairman Allday recently observed that anyone sitting at his desk has to be impressed by two basic facts about the electric industry. First, we as a nation will need to build a lot of generating capacity over the next 10 years. Some estimates say we may need as much as $200 billion of new capacity by the year 2000. The second impressive fact is that there are many bidders who are eager to build that capacity. The primary challenge facing the Commission in this area is to handle the flood of cases coming before us wisely, consistently, reasonably, and quickly. We must carefully guard against any possible problems with market power while allowing the competitive market to emerge without unnecessary or inappropriate federal interference.

The Commission intends to continue to foster increased competition in the electric industry, to remove unnecessary regulatory barriers, and to promote the efficiency of utility operations.

OIL PIPELINES

Finally, the Commission is asking Congress for $3.2 million to regulate the rates and practices of interstate oil pipeline companies. These funds will be used to deal with a number of contested major oil pipeline rate cases and associated policy issues in various stages of litigation.

CONCLUSION

In conclusion, I want to emphasize that funding for FERC activities will be completely offset by revenues generated from Commission fees and annual charges. The Commission is required by law to assess and collect fees and annual charges in amounts sufficient to recover all of the costs incurred by the Commission, including any hearing costs and indirect personnel costs. The revenue generated from these fees and charges is used to offset the Commission's annual appropriations so as to result in a net cost to the Treasury of zero dollars.

On behalf of Chairman Allday, I want to assure this Subcommittee that the Commission is committed to regulating the industries under its jurisdiction in a fiscally sound and environmentally responsible manner. Chairman Allday believes that the budget request that we have submitted for your consideration will support meeting these objectives.

Thank you for your consideration of our request. I will be happy to respond to any questions which you may have at this time.

FY 1991 APPROPRIATIONS LANGUAGE

Mr. Bevill. How and why does the appropriations language proposed by the Administration for FERC for FY 1991 differ from last year's language?

Mr. Scherman. The proposed language provides for "no-year" funding, thereby making our entire appropriation available until expended at the beginning of the year instead of being converted during the year as revenues from annual charges and fees are received. The long term result of the new language will be to reduce each fiscal year burdensome administrative and accounting transactions between the Commission and the Department of Energy. The proposed new language will not change or impact how the Commission operates but will simplify control of our appropriation.

Previous language stipulated that a specific amount be made available for contractual activities at the beginning of the fiscal year to be available until expended. The language proposed for FY 1991 has no such specific provision.

Additionally, the limit for "official reception and representation expenses" has been increased from $2,000 to $3,000.

Finally, language that was applicable to FY 1990 only has been deleted. This language directed that revenues collected under the authority of section 3401 of the Omnibus Budget Reconciliation Act and held in suspense pending the final outcome of litigation, be immediately credited to the general fund of the Treasury. Since this litigation was completed, this reference was no longer needed in our appropriations language.

OFFSHORE NATURAL GAS TRANSPORTATION

Mr. Bevill: Describe your initiatives with respect to open access transportation of offshore natural gas.

Mr. Scherman: On December 9, 1988, the Commission issued a Final Rule in Order No. 509, entitled "Interpretation of, and Regulations Under, Section 5 of the Outer Continental Shelf Lands Act Governing Transportation of Natural Gas by Interstate Natural Gas Pipelines on the Outer Continental Shelf." This rule issued to every jurisdictional interstate natural gas pipeline that transports gas on or across the Outer Continental Shelf (OCS) a blanket certificate authorizing and requiring nondiscriminatory transportation of natural gas. The rule also requires every OCS pipeline to file tariffs to implement that blanket certificate authorization. The service provided under the blanket certificate includes both firm and interruptible transportation service. OCS pipelines must, pursuant to the blanket certificate and section 5 of the Outer Continental Shelf Lands Act (OCSLA), provide open and nondiscriminatory access for both owner and nonowner shippers. Order No. 509 only applies to those interstate natural gas pipelines that hold a certificate under section 7 of the Natural Gas Act authorizing the construction and operation of facilities on the OCS. Issues concerning other offshore entities will be considered on a case-by-case basis when OCSLA issues are raised.

TAKE-OR-PAY POLICY STATUS

Mr. Bevill. Please describe the status of your "Take-or-Pay" problem.

Mr. Scherman. On December 13, 1989, the Commission issued Order No. 500-H, the Commission's final rule addressing the decisions of the U.S. Court of Appeals for the D.C. Circuit in which the court held that the Commission had not adequately addressed pipeline take-or-pay problems arising as a result of open access transportation. In Order No. 500-H, the Commission found that pipelines have resolved the bulk of their take-or-pay problems through settlements with producers. In Order No. 500, the Commission stated that, through their settlements, pipelines have obtained about $44 billion worth of relief for payments of, on average, about 18 cents on the dollar.

Accordingly, in Order No. 500-H, the Commission continued the take-or-pay crediting provisions adopted in Order No. 500 until the earlier of the date a pipeline accepts a Gas Inventory Charge or December 31, 1990. The Commission determined not to take action under NGA section 5 action to directly modify pipeline-producer take-or-pay contracts. The Commission explained that since its section 5 authority is limited to jurisdictional contracts, section 5 action would be ineffective or inequitable, and could well impede the overall resolution of the take-or-pay situation. The Commission further explained that, in any event, pipelines are resolving the bulk of their take-or-pay problems through settlements.

In Order No. 500-H, the Commission also continued its take-or-pay passthrough policy unchanged except to extend the deadline for pipelines to file to passthrough take-or-pay costs under the Order No. 500 alternative mechanism until December 31, 1990 or 30 days after the D.C. Circuit issues its mandate upon completion of judicial review of the final rule. In Order No 500-H, the Commission made no change to its Order No. 500 GIC policy statement, but stated that it would continue to develop its GIC policies on a case-by-case basis.

On February 12, 1990, the Commission issued Order No. 500-I generally denying rehearing of Order No. 500-H. Appeals from Order Nos. 500-H and 500-I will be heard by the U.S. Court of Appeals for the D.C. Circuit. The Court has scheduled oral argument for May 8, 1990.

ALTERNATIVES FOR TAKE-OR-PAY RELIEF

Mr. Bevill. What alternatives do you have in mind if the courts continue to rule against the Commission's approved mechanisms for the recovery of take-or-pay costs?

Mr. Scherman. The Commission continues to believe that allocating the costs recovered in the fixed take-or-pay charge based on purchase deficiencies is the most equitable method of for pipelines to recover these costs. The purchase deficiency methodology comes closest to requiring those who caused the take-or-pay problem through reduced purchases to bear their fair share of the costs of resolving that problem. Accordingly, the Commission requested rehearing of the D.C. Circuit's decision in Associated Gas Distributors v. FERC (AGD II) which held that the purchase deficiency allocation methodology violates the filed rate doctrine.

On Friday, March 30, 1990, the D.C. Circuit Court of Appeals denied the suggestions for rehearing en banc. Chief Judge Wald, Judges Mikva and Edwards dissented, and would have heard en banc the rehearing petitions. In addition, the Commission has voted to request that the Solicitor General of the United States seek a writ of certiorari from the United States Supreme Court in AGD II and Columbia Gas Transmission Corp. v. FERC, decided by the D.C. Circuit on February 9, 1990.

Although other alternatives may be proposed if further judicial review is unsuccessful, industry participants have proposed two primary alternatives to the currently approved recovery mechanism. One proposal would allocate the costs included in the fixed charge based on the contract demand of both sales and transportation customers. The second alternative involves replacement of the fixed charge with a volumetric surcharge on all throughput.

INCENTIVE RATEMAKING

Mr. Bevill. What is the status of the Commission's review of "Incentive Ratemaking" and describe how the Commission would assure that consumers share in any cost savings?

Mr. Scherman. The Commission is currently continuing its review of a number of plans for incentive regulation. Although the specific mechanics of incentive regulation have not been formulated, all of the plans currently under consideration have four basic features that are briefly discussed below. Also, all of these plans provide for the pipeline and its customers to share in any cost savings and other efficiency gains.

The first basic feature is an initial price cap which would be the traditional, FERC-approved, cost-based pipeline rate. This feature, in effect, establishes the "base rate" from which subsequent adjustments would be made.

The second feature is an automatic rate adjustment using a benchmark index based on a composite measure of industry-wide changes in cost, productivity and demand. For example, an increase in industry-wide labor costs would increase the benchmark index, whereas an increase in industry-wide productivity would reduce the index. However, only a portion of the productivity increase would be used to adjust the index, thereby permitting pipelines and ratepayers to share in productivity gains. This periodic rate adjustment mechanism should eliminate the current three-year rate review applicable to most pipelines.

Flexible pricing is the third basic feature of incentive regulation. This would give pipelines greater latitude to design prices that are market-responsive. Since a customer would always have the option of purchasing service at the FERC-approved price cap, any transaction under flexible prices must be mutually beneficial and would be at the customer's option.

Finally, incentive regulation requires guidelines for long-term rate reviews which incorporate the important principle that pipelines and ratepayers should share efficiency gains. This is the primary motivation for making incentive regulation an option for interstate pipelines and their customers. It is expected that the method and degree of sharing could vary within guidelines yet to be established.

GAS INVENTORY CHARGES

Mr. Bevill. Please provide further explanation of your implementation program for "gas inventory charges (GIC)".

Mr. Scherman. The Commission originally discussed GICs in Order No. 500 as part of its response to the decision of the U.S. Court of Appeals for the D.C. Circuit in Associated Gas Distributors v. FERC (AGD I).

The Commission proposed GICs in Order No. 500 as a means of facilitating the renegotiation of longer term gas supply arrangements between the pipelines and their customers, which would also help avoid a future recurrence of the existing take-or-pay problems. The Gas Inventory Charge is intended to compensate a pipeline, on a current basis, for contracting for gas supplies in order to meet its customers' demands for firm sales service. In Order No. 500, the Commission did not specify the exact form a GIC should take, but established certain general principles to which a GIC should conform. One of these principles is that the pipeline may not recover take-or-pay costs by any other means. The remaining principles, stated in the Commission's regulations, are intended to match the pipeline's obligation to its customers' nominated levels of service and to ensure that the customer may freely nominate service on the basis of known prices.

In reviewing GIC proposals, the Commission's primary concern is to ensure that customers have a clear choice between the GIC service and transportation service. As such, the Commission's review has concentrated on two main areas. First, that the pipeline's firm transportation service is comparable in quality to the proposed GIC service. Second, that there is sufficient gas available in the marketplace to be purchased by the customer from other sources.

"Permanent" GICs have been authorized for four pipelines: Transwestern Pipeline Company, Texas Eastern Transmission Corporation, Columbia Gas Transmission Corporation, and El Paso Natural Gas Company. El Paso, however, has deferred acceptance of its GIC certificate pending Commission action on requests for rehearing of its authorization. El Paso's application was the first to be processed under the recently established "paper hearing" procedure, which permits tne parties to file pleadings directly with the Commission rather than though formal adjudicatory proceedings before an Administrative Law Judge.

Kentucky West Virginia Gas Company applied for permanent and interim GIC authorizations, but both were rejected because the proposals were not consistent with the Commission's policies and GIC principles.

Permanent GIC applications are currently being processed under the paper hearing procedures for five pipelines: Transcontinental Gas Pipe Line Corporation, Natural Gas Pipeline Company of America, Tennessee Gas Pipeline Company, Southern Natural Gas Company, and Texas Gas Transmission Corporation.

In addition, applications for permanent GICs for Northern Natural Gas Company and National Fuel Gas Supply Corporation have been set for formal hearing before administrative law judges. As requested by Northern and its customers, Northern's GIC application was consolidated with its rate proceeding and set for formal hearing because of its interrelationship with that proceeding. National Fuel's GIC application was set for formal hearing largely because the Commission wanted the parties to consider whether National Fuel needs a GIC and to explore alternatives to a GIC.

Northwest Pipeline Corporation has two separate, but similar, GIC proposals pending before the Commission. One application has been set for formal hearing. The other was filed in conjunction with Northwest's negotiations with its customers to execute new long-term service agreements. The Commission recently requested Northwest's customers and other affected parties to clarify their positions on Northwest's proposal.

"Interim" GIC certificates have been issued to Transco and Natural within the past year. Transco received a two-year authorization and Natural received a one-year certificate. Both were granted in accordance with the terms of settlements between the pipelines and their customers.

The Commission expects pipelines that purchase most of their needed gas supplies from producers, in contrast to purchasing from other pipelines, to file for GICs. Pipelines that purchase primarily from upstream pipelines may not want a GIC, but instead may seek to implement some method for flowing through to their customers GIC charges that are billed to the pipelines. The Commission recently approved a company-specific approach for Carnegie Natural Gas Company's flow-through of charges from its upstream pipeline supplier, Texas Eastern.

CAPACITY BROKERING

Mr. Bevill. Describe your examination of "capacity brokering" and describe the potential benefits to the consumer.

Mr. Scherman. Uniform rates and traditional contract terms may not give pipeline customers the incentive or the flexibility to use pipeline services most efficiently. To satisfy peak winter demands, customers fully book capacity on some pipelines, often leaving them with excess capacity during off-peak periods. For other customers, current reservations no longer correspond to current demands in any period.

To encourage efficient use of pipeline services, the Commission advocates seasonally differentiated rates for pipelines with capacity constraints during a peak period. However, seasonal rates alone may not lead to improved efficiency. Customers also must be able to respond to the new rate design, and capacity brokering is one mechanism which allows this.

Consumers should benefit from capacity brokering in a number of ways. Capacity brokering would enhance flexibility by giving firm shippers a right to sell or reassign unused capacity rights in a secondary market. Revenues from these sales would reduce the cost of holding capacity to meet peak needs. Capacity brokering also should benefit consumers by enhancing long-term supply security. Finally, since all brokered transactions would be voluntary, trades would occur only when both parties benefit.

NORTHEAST AND WEST EXPANSION PROJECTS

Mr. Bevill. Please describe the Federal Energy Regulatory Commission's efforts to review and foster the expansion of gas pipelines in the Northeast and in the West.

Mr. Scherman. The Commission has employed different approaches to processing new service applications for the

Northeast and the West due to the types of proposals involved.

In the Northeast, the Commission was faced with a variety of proposals to serve a large number of customers in a relatively small geographical area. The Commission initiated an "open-season" process in July of 1987 by inviting applications to provide new gas service to the Northeast in order to establish a finite class of projects that could be evaluated in a timely manner. It received 72 separate applications to provide new gas service to the Northeast during this open-season period.

These 72 applications were consolidated into 31 distinct projects. Fifteen of these projects were determined by the Commission to be discrete and eligible for expedited review without the need for potentially lengthy comparative hearings. One other project was dismissed as moot and two were determined to be improperly included in the open-season. The remaining 13 potentially competitive projects were consolidated into one proceeding and a settlement judge was appointed. It was possible to identify a number of discrete projects. That is, projects which propose to serve markets which do not overlap, or are not mutually exclusive with the market proposed to be served by another project. This process, which ultimately resulted in the identification of 27 separate projects to serve the Northeast, did not judge the merits of the proposals but found that such projects warrant separate processing.

In addition to the innovative procedural approaches mentioned above, processing of these applications has also been expedited by the requirement for project sponsors to submit formatted environmental data to facilitate the review of their proposals, reassignment of staff resources to the environmental review function, use of an environmental support services contract to enhance staff effort, and the phasing of project review to certificate proposed facilities according to applicant-requested schedules.

To date, the Commission has authorized 18 of the 27 projects proposed for the Northeast and is in the process of evaluating the remaining 9 projects. This evaluation includes the consideration of various issues such as environment, rates, economics, need, market, and gas supply that may be developed during the proceeding. These efforts have resulted, to date, in the certification of 43% of the total 4.6 Bcf in daily volumes represented by the Northeast proposals. It is expected that the Commission will consider the remaining projects this year.

The Commission, to date, has not found it necessary to utilize a Northeast type "open-season" process for the West Coast expansion projects. Instead, the Commission has proceeded on a case-by-case basis. The Commission has been able to issue five certificates for optional expedited certificate proposals to serve the enhanced oil recovery or local distribution company markets in California after a review of environmental and other issues raised in each proceeding. These proposals involve a total of 2.85 Bcf in daily deliveries, which may or may not ultimately be built depending upon the market.

At the present time, the Commission staff is in the process of evaluating separate certificate applications filed by Pacific

Gas Transmission Company and the Altamont Gas Transportation Project. Public scoping meetings in western cities have been conducted to receive input from state and local governments and the general public. While this environmental review continues, the staff is evaluating the records in these proceedings and the comments of over 150 intervenors and protestors. The Commission hopes to consider these applications around the end of this year.

MOBILE BAY APPLICATIONS

Mr. Bevill. Please describe the program of FERC to deal with the transportation and distribution of the natural gas located in the Mobile Bay Region of Alabama.

Mr. Scherman. In August 1988, the Commission recognized the potential for a large number of applications to be filed in order to construct natural gas pipelines to either bring gas produced in the offshore Alabama area to shore, or to take gas from one of the proposed natural gas processing plants to be constructed in southern Mobile County, Alabama, to markets throughout the United States. In response to this expectation, on August 1, 1988, the Commission issued a Notice Of Deadline For 1989-1990 Certification Of Mobile Bay Construction Applications. There, the Commission announced a deadline for filing of applications to construct and operate pipeline facilities for transportation of natural gas out of the Mobile Bay area, where certification for such construction is requested no later than the end of calendar year 1990. The Commission received 15 applications as a result of this notice. After consolidation by several of the project proponents, and withdrawal of one of the filings, the Commission's staff is currently moving forward on ten of the applications.

On October 4, 1989, the Commission issued a procedural order in this proceeding which, among other things, indicated that further information was needed in order to process one of the applications, found competition between two of the filings and determined that proposed onshore capacity was twice the quantity of gas which would be available from offshore sources.

On December 19, 1989, the Commission staff issued a Notice Of Intent To Prepare A Comprehensive Draft Environmental Impact Statement For The Proposed *Mobile Bay Pipeline Projects*, Request For Comments On Its Scope, And Notice Of Public Meetings. Staff is currently on target to issue an EIS in this proceeding in the third quarter of 1990.

Upon resolution of the environmental, rate, gas supply and public interest issues in this proceeding, and in keeping within the timeframe expressed in the Notice Of Deadline For 1989-1990 Certification Of Mobile Bay Construction Applications, it is expected that the Commission will consider these applications by the end of calendar year 1990.

LONG TERM OUTLOOK FOR NATURAL GAS

Mr Bevill. What is the long-term outlook for natural gas prices, supplies and deliverability?

Mr. Scherman. Current gas prices are no longer subject to the extreme volatility of the early and mid 80's. However, the last few years have shown that the entire supply side of the industry has become more demand and price sensitive. As the demand has increased or decreased, prices have responded appropriately, and the production indicators such as rigs, seismic crews, reserves, and production have also responded accordingly.

Long term outlook for natural gas markets reflects a heightened competition among natural gas suppliers and suppliers of alternative fuels. This increasingly competitive market structure is developing in response to the relative growth in price decontrolled gas, regulatory changes, and the growing willingness of gas users to switch suppliers. These factors are leading to development of new marketing tools and strategies. Parties today rely on varying mixes of spot sales, short term supply agreements and longer term supply agreements -- with periodically renegotiated prices -- from various sources to optimize their purchasing decisions.

Natural gas supplies have been shown to be directly responsive to price. In a competitive market, if demand in a particular sector increases substantially, the price will rise accordingly as the industry responds to increased demand.

The Energy Information Administration of the Department of Energy is responsible for projecting long term energy needs. However, the Commission often receives projections and studies in support of proposed projects. I will attempt to answer your inquiry using these references.

Total gas quantities supplied to this country are expected to come from an increased number of different sources: domestic and foreign, conventional and unconventional, natural and synthetic. Current estimates of the total resource base including proven, probable, possible, and speculative reserves range from 250 to 1200 Tcf, with a general consensus in the 600-800 Tcf range. Broadening of the supply base will occur as a market response to increasing natural gas prices. As price rises in response to demand driven pressures, previously marginal supply alternatives become viable. Long term supply projections continue to make the assumption that the resource base is more than adequate to technically meet the most optimistic demand scenario, that it will be market sensitive and able to respond predictably. So this assumes that the resource base will continue to support, for at least the next 300,000 wells, conversion of drilling activity to reserves in moderate increments at a competitive price.

Mr. Bevill. What steps is the Commission taking to promote the long-range security of gas supplies?

Mr. Scherman. As you know, the Commission's responsibilities over wellhead markets have been decreasing since the passage of the Natural Gas Policy Act of 1978. The passage of the Natural Gas Wellhead Decontrol Act of 1989 will result in the full and complete decontrol of natural gas wellhead prices by 1993. These measures leave the regulation of natural gas prices where they should be -- to the marketplace. As a result, the large imbalances between demand and supply experienced in the past are not expected to recur.

While the Commission's control over the production of natural gas is minimal, there are steps the Commission can take to enhance the environment for longer term supply arrangements. By reducing regulatory barriers, enhancing regulatory certainty, and by adopting efficient pricing policies, the Commission can help ensure that all industry participants -- including consumers -- operate in a stable, understandable market. These steps should enhance the market's ability to supply the quantities of gas needed today and tomorrow.

The Decontrol Act of 1989 does not fully deregulate natural gas wellhead prices until 1993. However, the Commission can take certain measures to reduce the regulatory burden on producers now. To the maximum extent possible, the Commission will terminate regulatory requirements which are no longer necessary.

The Commission's open access blanket transportation program has reduced the regulatory barriers to market-directed flows of natural gas. Most interstate pipelines hold blanket certificates which permit the construction of certain facilities to attach new sources of supply on a self-implementing basis or by prior notification to the Commission based on the project's cost. Additionally, the Commission is committed to processing new facilities projects in an expeditious and timely manner. Through both case-by-case review and rulemaking efforts, the Commission continues to refine open access and its procedures for processing certificates. One of the Chairman's goals is to provide a greater degree of regulatory certainty as a basic building block for the market place.

The Commission's ratemaking initiatives will also enhance long-term supply security. The rate design policy review, currently ongoing in over 40 individual pipeline rate cases, should result in rates which ensure that the gas transmission system operates at a high level of efficiency, and that scarce services go to those who want them, or need them, most. The implementation of gas inventory charges, or GICs, should provide the revenue stream producers need to find and develop new reserves of gas, while at the same time ensuring that those who require the certainty of a secure supply pay for it on a current basis.

WORKLOAD

Mr. Bevill. Your budget states that the Commission will process about 26,000 workload items during 1991, including more than 15,000 docketed program workload items. Please describe the effort and compare this workload with FY 1989 and FY 1990.

Mr. Scherman. The Commission expects to process approximately 26,000 workload items during FY 1991, a significant portion of which will involve highly complex and technical filings which may require formal hearings. Also, in our hydropower licensing and pipeline certificate programs, a number of items will require preparation of environmental impact statements. The number of workload items processed during FY 1990 is estimated to be about 28,000, as compared to 37,208 actually completed during FY 1989.

The Commission estimates receipts during FY 1991 to be 24,287 and in FY 1990 to be 27,444. Actual receipts in FY 1989 were 35,509.

I would like to point out that while the overall workload is declining, most of the decrease is attributed to one program--Producer Regulation--and we have reduced staff in this area and assigned them to other existing program areas. The reduced workload was primarily in the jurisdictional agency determinations area, which decreased by over 8,000 items from FY 1989 to FY 1991.

AUTOMATION AND DATA COLLECTION

Mr. Bevill. Describe the Commission's automation and data collection management program.

Mr. Scherman. Natural gas companies began filing certificate applications, tariff filings, and rate filings with the Commission on electronic medium on November 1, 1989 pursuant to Order No. 493. In December, 1988, pipelines started filing public-use forms data electronically, also required under Order No. 493. Additionally, Order No. 483 required those pipelines which choose to adjust their rates utilizing the purchased gas adjustment, PGA, mechanism to begin filing the Form No. 542/PGA in June, 1988. In addition, Order No. 497 required pipelines with affiliates to commence filing the Form No. 592 in September, 1988. Both the Form No. 542/PGA and the Form No. 592 are also required to be filed on magnetic medium.

With the implementation of electronic reporting requirements for the majority of the data filed with the Commission by the natural gas pipeline industry, the Commission has available more automated information than ever before to integrate into its review and decision-making processes. The electronic filing requirements of Order Nos. 483, 493 and 497 posed a considerable challenge to both the industry and the Commission to develop appropriate systems and procedures to ensure effective access to automated information.

At this time, automated systems are either in place or are under development for accessing data filed on electronic media. In addition, industry has received software developed by the Commission to implement various aspects of the requirements of the referenced orders. As both the industry and the Commission gain experience with filing and processing electronically submitted material, the Commission expects to refine and enhance the system capabilities as circumstances warrant.

NATURAL GAS AND HYDRO INITIATIVES

Mr. Bevill. Describe your new initiative to change the structure of the Natural Gas and Hydropower programs.

Mr. Scherman. The Commission is advancing several initiatives to adjust its regulatory approaches and regulations to better address the realities of a changing natural gas industry. Some of the changes within the industry are simply a reflection of a more mature industry. Other changes have their genesis in changes brought about by the Natural Gas Policy Act of 1978 and the Natural Gas Wellhead Decontrol Act of 1989.

The Commission's principal initiatives over the past several years have been directed to open-access transportation and natural gas pipeline rate design. The regulations providing for open-access transportation have been in place for several years and are working reasonably well. However, the Commission is continuing to examine innovative rate design options that enhance competition and economic efficiency, and deal with bottleneck problems that adversely affect gas supply and prices. On May 30, 1989 the Commission issued its Policy Statement Providing Guidance With Respect to the Designing of Rates. The Commission stated that the purpose of the Policy Order was to provide additional guidance on how to implement the Commission's rate objectives and policies under open-access transportation regulations. The parties in ongoing proceedings are exploring the issues of the appropriate rate design to meet the objectives outlined in the Rate Design Policy Statement.

For example, pipelines have proposed various ways to design seasonal rates for peak and off-peak periods. Additionally, the parties are exploring issues related to the level of fixed costs that should be included in the rates for interruptible transportation service. The parties are also exploring the issue of how to reflect the volumes associated with discounted transportation rates in the level of the projected transportation units. The Commission expects to address all of these proceedings in a timely fashion.

Take-or-pay problems presented major obstacles to earlier implementation of open-access transportation on many pipeline systems. The Commission has attempted to deal with past take-or-pay through the Order No. 500 "equitable sharing" mechanism. Certain features of this mechanism have recently received unfavorable judicial review. The Commission expects that, through options such as pursuing further judicial review or modifying its regulations, satisfactory procedures for dealing with past take-or-pay can be put into place.

The Commission has proposed to use Gas Inventory Charges (GIC) to deal with future take-or-pay. The GICs are intended to assure customers that firm gas supplies will be available up to the amount of their nominations while avoiding any future accumulation of unfunded take-or-pay costs. The Commission is continuing to explore the use of interim GICs while applications for permanent GICs are still pending.

The Commission is also looking at the concepts of incentive ratemaking which would provide pipelines with a stronger incentive to lower the cost of operations and to price services more efficiently. This would be achieved by giving pipelines a stronger motivation to innovate and streamline operations by allowing them to retain a portion of any cost-savings gains they achieve. And, consumers also benefit by receiving a share of those gains.

The Commission is also examining capacity brokering and other forms of capacity reassignment as additional means of enhancing competition in the natural gas industry. For example, the Commission recently issued a capacity brokering certificate to Texas Eastern Transmission Corporation. Capacity brokering proposals are expected to increase and be one of the main focal points of the Commission's ratemaking and certificate activities.

Along similar lines, the Commission has required that the parties in specific cases explore capacity adjustments in conjunction with certain rate design changes. This initiative will help to redistribute current pipeline capacity in an efficient manner so that those who value the capacity the most will be the ones that acquire firm capacity service.

Turning now to the hydro area, the Commission has undertaken several major initiatives in the past several years to change the structure of the Hydropower program and to improve its efficiency. In 1988 the Commission completed a significant reorganization of the Office of Hydropower Licensing (OHL). This reorganization has provided the structure and mix of resources appropriate to accomplishing the three primary responsibilities of the Hydropower Program -- licensing, compliance, and dam safety.

Within the new OHL structure, the Commission has also established a Planning and Support Branch that has initiated an active outreach program. This new branch has sought, through interaction with prospective relicensing applicants and resource agencies, to explain the Commission's changing hydropower program, and to prepare for the filing of large numbers of relicense applications in 1991.

In addition, the Commission has placed new emphasis on ensuring compliance with its hydropower orders and regulations. As part of the reorganization, the Commission established a Division of Project Compliance and Administration to centralize compliance monitoring and to increase managerial oversight of compliance activities. This new division has allowed the Commission to process what is now the largest, and fastest growing, component of its hydropower workload, and to establish a program to recommend penalties to the Commission for acts and patterns of noncompliance on the part of licensees and exemptees.

Since 1988 the Commission has also used a private-sector contractor to support staff in the preparation of environmental documents needed in the analysis of licensing and compliance actions. The use of a private-sector firm for technical support has allowed the Commission to better handle the growing percentage of applications that require Environmental Impact Statements in order to reach licensing decisions.

The Commission has also issued or proposed new regulations to restructure its hydropower licensing and relicensing procedures. In 1989, the Commission promulgated new relicensing regulations that implemented the relicensing provisions of the Electric Consumers Protection Act. In March of this year, the Commission issued a Notice of Proposed Rulemaking for regulations governing submittal of proposed hydropower license conditions and other matters. This NOPR, among other things, seeks to clarify the implementation of Section 10(j) of the Federal Power Act, to establish deadlines for the submission of license and exemption conditions by Federal and state agencies, and to explain the roles to participants in the Commission's hydropower licensing and exemption processes.

NATURAL GAS TRANSPORTATION STRATEGY

Mr. Bevill. Describe FERC's strategy for innovative development of natural gas transportation.

Mr. Scherman. The Commission has developed a streamlined and more efficient certificate process through the establishment of blanket certificate programs for the construction of facilities and open access transportation. Smaller routine non-mainline projects within certain dollar limits which are adjusted annually for inflation may be constructed under a blanket certificate on a self implementing basis or by prior notification subject to specified environmental conditions and reporting requirements. This process reduces the number of case specific authorizations resulting in quicker action on minor construction projects.

Order Nos. 436/500 provide for open access, non discriminatory transportation service, including a blanket certificate program. The interstate pipeline's blanket certificate permits self implementing transportation service for a 120-day period for certain shippers and prior notification for service beyond 120 days. Interstate and intrastate pipelines may initiate transportation service under existing tariffs without prior notification to the Commission subject to the "on behalf of" provision of section 311 of the NGPA and certain reporting requirements. These procedures permit transportation service to go forward in a timely manner and significantly reduce the number of cases requiring specific Commission authorization.

As part of Order Nos. 436/500, the Commission also initiated the optional certificate procedure to permit the construction of facilities, with no dollar limit, for sales or for non-discriminatory transportation service. The optional procedure was developed to foster competition by eliminating the traditional issues of supply and market where the applicant is willing to assume an appropriate amount of risk.

Facilities may also be constructed with no dollar limit by an interstate pipeline providing NGPA Section 311 transportation service without prior Commission NGA Section 7 approval subject to specified environmental conditions. However, unlike NGA Section 7 authorization, NGPA Section 311 does not confer the right of eminent domain for construction.

The Commission is continuing to modify its pipeline certificate programs to reflect the changes taking place in the natural gas industry by replacing certain case specific authorizations with blanket certificates resulting in reduced processing time in certain programs.

Currently, Commission Moler is heading a task group which is undertaking a review of all regulations implementing the Natural Gas Act, the Natural Gas Policy Act and the National Environmental Policy Act. The results of the task force should assist in the further streamlining of certification process, while maintaining an appropriate balance between timely responsiveness to competitive market forces in the gas industry and the Commission's current statutory requirements.

RATE DESIGN INITIATIVES

Mr. Bevill. Describe the pipeline rates designed to promote more efficient production.

Mr. Scherman. The Commission's overall approach in developing pipeline rates for open-access transportation is to promote more efficient production of natural gas, as well as to promote other objectives. As a companion to the open-access transportation program and rates, the Commission's abandonment policies further promote efficient production by permitting the parties to agree to release gas to those markets that better match the objectives of promoting efficient production and satisfying market demands.

In short, the Commission's policies and approaches in designing pipeline rates are intended to give parties wide latitude in addressing their respective interests and requirements. This overall approach establishes a climate in which optimum efficiencies can be achieved throughout the natural gas industry -- including the production segment of the industry. The Commission prefers this approach, rather than continuance of rigid regulatory approaches of the past, as the best way to satisfy the statutory requirement that customers be provided long-term reliable natural gas services at reasonable rates.

NATURAL GAS MARKETERS

Mr. Bevill. Describe the emergence of gas marketers and the difficulties this new phenomenon has created for FERC and the industry.

Mr. Scherman. Gas marketers arose in the early 1980's because of the surplus of natural gas and the Commission's open access transportation program adopted in Order Nos. 436 and 500. Before the open access program was adopted, most users of natural gas could only purchase gas from a pipeline since pipelines generally refused to transport gas in competition with their own sales. After the open access transportation program was adopted, marketers were able to buy surplus gas and have it transported to any of their purchasers. The Commission initially granted blanket certificates to marketers to facilitate their sales for resale in interstate commerce because many marketers wished to make sales for resale in the spot market. Since 1988, the Commission has issued blanket certificates with unlimited terms to marketers who are not affiliated with interstate pipelines since experience showed that such blanket certificates presented no problems. However, the Commission limits the term of blanket certificates granted to marketers affiliated with interstate pipelines to one year because of the potential for affiliate abuse.

While the Commission viewed the emergence of gas marketers as a positive phenomenon since it increases competition, the Commission recognized that there was a potential for abuse or preferential treatment when an interstate natural gas pipeline deals with an affiliated marketing or brokering affiliate. After receiving comments from all segments of the natural gas industry in response to a Notice of Inquiry and a Notice of Proposed Rulemaking in Docket No. RM87-5-000, the Commission adopted standards of conduct and reporting requirements to govern the relationship between interstate pipelines and their gas marketing affiliates in Order Nos. 497 and 497-A. The Commission is presently considering petitions for rehearing of Order No. 497-A.

ELECTRIC POWER OUTLOOK

Mr. Bevill. What is the outlook for meeting the Nation's electric power needs over the next two decades?

Mr. Scherman. The Department of Energy's Energy Information Administration (EIA) projects a 2.6% average annual growth rate in U.S. electricity sales over the 1988-2000 year period. The North American Electric Reliability Council (NERC) which collects and coordinates forecasts from all U.S. electric utilities, projects a 2.0% average annual growth rate in the U.S. for both summer peak demand and annual net energy for load. Regardless of which growth rate one would use, in order to meet this demand, the electric utility industry will need substantial new generating capacity and will need to institute conservation and load management programs over this decade and into the next century.

NERC projections show capacity additions over the 1989-1998 period of 72,200 Megawatts. The generation additions by type and retirements is shown in a table which I would like to insert in the record.

(The information follows:)

GENERATING UNIT ADDITIONS AND RETIREMENTS
1989-1998

Type	Thousands of MW	% of Total
Nuclear 1/	11.2	15.5
Coal	13.5	18.7
Hydro	1.4	1.9
Oil/Gas	20.2	28.0
Pumped Storage	2.4	3.3
Other (Utility)	5.4	7.5
Non-Utility Generators	18.1	25.1
Total Additions	72.2	100.0
Retirements	6.6	

Source: NERC 1989 Reliability Assessment

1/ Includes the Shoreham 809 MW nuclear unit.

This shows that substantial amounts of new capacity-- 18,100 MW -- is expected to be built by non-utility generators, i.e., independent power producers and qualifying facilities.

Our review of the 1989-1998 projected capacity reserve margins over the projected annual firm peak demands, including the above NERC additions, shows that there will be adequate reserves in most regions of the country when compared to what is generally considered to be an adequate minimum reserve level of 15%. Some regions show declining reserve margins but from levels substantially above a 15% minimum level. However, at least one region, New England, projects reserves less than 15% in the later half of this decade and either additional imports into that region or additional generation additions should be encouraged. Recent peak demands which have shown growth rates greater than expected suggest that electric utilities in other areas may also need even greater capacity additions.

Mr. Bevill. What steps need to be taken to ensure that generating capacity is sufficient to meet demand?

Mr. Scherman. Both traditional utilities and other developers of generation should be given appropriate incentives to build needed capacity, to build it in an efficient manner and with due regard for the effects of such generation on the environment. The Commission has several policies for implementing these incentives. We support state bidding procedures for acquiring new capacity, encourage independent power producers by approving market based rates, relax regulatory burdens where appropriate to further encourage market based outcomes on a case-by-case basis, certify efficient cogeneration and small power production alternatives under the Public Utility Regulatory Policies Act of 1978, allow certain costs of construction work in progress in rate bases for new utility generation resources, and allow innovative transmission pricing that will allow optimal siting of new generation resources.

The Commission's goal is to implement regulatory policies that either simulate or rely upon market outcomes. We are confident that such policies will assure that needed capacity will be built for maintaining a reliable and efficient electric supply in the U.S.

COMPETITION IN THE ELECTRIC POWER INDUSTRY

Mr. Bevill. What is the status of FERC's efforts to promote a more competitive environment in the electric power industry and to encourage the role of independent power producers?

Mr. Scherman. The Commission has been encouraging the development of competitive electric markets wherever the circumstances in individual cases permit the Commission to do so. For instance, the Commission has permitted market-based pricing, instead of traditional cost-based pricing, where it has been demonstrated that, *inter alia*, the seller lacks market power and there is a price cap based on the purchaser's cost or on the seller's cost. This lack of market power can be due either to the pre-existence of a competitive market or to actions by the sellers to mitigate market power. An example of the latter is where sellers provide buyers with access to their transmission systems and thereby to alternative sources of supply.

Independent power producers, where they lack market power, have been permitted to price capacity and energy at market-based rates. The Commission has also provided independent power producers with modified financial and accounting regulatory treatment where it is appropriate to do so.

BAN ON INTERVENOR FUNDING

Mr. Bevill. What is the current status of the prohibition to pay the expenses of intervenors?

Mr. Scherman. In both the Fiscal Year '89 Energy and Water Development Appropriations Act, enacted on July 19, 1989, and the Fiscal Year '90 Energy and Water Development Appropriations Act, enacted on September 29, 1989, the Congress modified its 1988 appropriations language which had prohibited the Commission from paying intervenor's expenses incurred in appealing an administrative decision to the courts. The U.S. Court of Appeals for the District of Columbia Circuit has held, in Electrical District No. 1 v. FERC, that the pre-1988 appropriations language, now restored in 1989/1990, merely barred the Commission from paying intervenors' expenses in administrative proceedings, but did not bar it from paying their expenses before the courts. Therefore, this year, as last, the Commission is required to pay judicial awards of legal fees to intervenors for their court appeals under the standards of the Equal Access to Justice Act.

RULEMAKING PROPOSALS

Mr. Bevill. What progress have you made in prioritizing and completing action on pending rulemaking proposals?

Mr. Scherman. The Commission has completed action on a number of rulemakings. We also have established priorities for all the pending rulemaking dockets in each area under the Commission's jurisdiction. The priorities vary in subject, importance, and complexity. This is necessary in order to have a manageable workload. Target agenda dates are selected for each item at the time the list is developed.

The Commission has completed action during the past year on the following:

- A final rule, and an order on rehearing of that rule, revising the regulations governing the relicensing of hydroelectric power projects, to implement the Electric Consumer Protection Act of 1986 (ECPA).
- A final rule (Order No. 500-H), and an order on rehearing (Order No. 500-I), on the Commission's natural gas open access transportation program, in response to the remands from the U.S. Court of Appeals for the District of Columbia Circuit.
- A notice of proposed rulemaking to implement the Natural Gas Wellhead Decontrol Act of 1989.
- An order on rehearing of the regulations requiring nondiscriminatory transportation of natural gas on the Outer Continental Shelf, to implement Section 5 of the Outer Continental Shelf Lands Act.
- An order on rehearing of the regulations containing standards of conduct and reporting requirements intended to prevent preferential treatment of an

affiliated marketer by an interstate pipeline in the provision of transportation services.

- An order on remand from the U.S. Court of Appeals for the District of Columbia Circuit, revising the regulations on the recovery by public utilities of costs for construction work in progress (CWIP).
- Orders on remand from the U.S. Court of Appeals for the District of Columbia Circuit, including an interim rule, a final rule, and an order on rehearing, revising the regulations on filing fees for natural gas rate and tariff filings.
- A notice of proposed rulemaking, a final rule, and an order on rehearing, revising the regulations for carrying out wellhead pricing refund requirements under the Natural Gas Policy Act of 1978.
- An interim rule and a final rule revising the formula for computing monthly carrying charges in purchased gas adjustment (PGA) filings.
- A final rule revising the procedural requirements for filing service agreements associated with transportation of natural gas pursuant to blanket certificate authority.
- The annual update of the rule concerning the generic determination of the rate of return on common equity for public utilities.

The rulemaking priorities that have been established for 1990 may be summarized as follows:

- On February 12 of this year, the Commission issued a final rule terminating prospectively certain incentive ceiling prices for high cost natural gas, in response to a remand from the U.S. Court of Appeals for the District of Columbia Circuit.
- On March 6 of this year, the Commission issued a notice of proposed rulemaking proposing regulations to codify the procedures used to administer Section 10(j) of the Federal Power Act, as added by Section 3(b) of ECPA.
- On March 23, the Commission issued a rule revising the formula for determining filing fees, so as to make them more equitable through use of three year averaging.
- This spring, the Commission will issue:
    - An additional order on rehearing of the marketing affiliates rule;
    - An order on rehearing of the final rule terminating prospectively certain incentive ceiling prices for high cost natural gas.
- This year the Commission will also consider:
    - A rule revising the filing fee categories for electric rate filings; and
    - A rule revising the Commission's procedures for processing applications for certificates to construct pipeline facilities used to transport natural gas.

WORKLOAD IMPACT OF PENDING LEGISLATION

Mr. Bevill. What legislation is now pending in Congress that would affect FERC workload?

Mr. Scherman. In July of 1989 Congress enacted the "Natural Gas Decontrol Act of 1989" providing for the phased elimination of all remaining wellhead price and nonprice controls on first sales of natural gas by January 1, 1993. Enactment of this legislation will significantly reduce the Commission's workload in the area of natural gas producer regulation.

FERC workload would also be reduced under the Administration's proposed "Oil Pipeline Regulatory Reform Act of 1989," introduced as H.R. 3092 and S. 1471 in August of last year. The Administration's proposal would eliminate unnecessary economic regulation of oil pipelines and reform any remaining regulations to increase competition.

Title V of H.R. 3030, the Administration's proposed amendments to the Clean Air Act, would require FERC to adopt regulations for a 5-year demonstration program for clean coal and other innovative technologies that would include establishment of an incentive rate of return and a 10 to 20 year amortization period for innovative emission control technologies. FERC would also be required to develop a process to negotiate cost caps for future clean coal and innovative technology projects and preapproval of the prudence of expenses within those caps.

The Commission's workload could also be increased under the requirements of H.R. 1113, the Office of Environmental Quality Authorization Act," approved by the House in October of 1989. Among other things, the bill would require the Council on Environmental Quality to issue guidelines for federal agencies, including FERC, to review a statistically significant sample of the environmental impact statements they have prepared to determine the accuracy of the predictions made therein, the extent to which specified mitigation measures were implemented, and the effectiveness of those measures.

S. 318, the "Coal Distribution and Utilization Act of 1989" would give the Secretary of Energy authority to determine whether the construction of a proposed interstate coal pipeline system would be in the national interest. The bill provides certain new regulatory authorities to FERC with respect to shipper access to such pipelines.

HYDRO RELICENSING WORKLOAD

Mr. Bevill. What is the outlook for the Commission's workload in the area of relicensing hydro facilities over the next decade?

Mr. Scherman. From 1990 to 1999, approximately 228 applications for relicense will be filed with the Commission. Of those, approximately 73% will be filed in 1991.

Mr. Bevill. Does the Commission have the necessary budgetary and personnel resources to do the job?

Mr. Scherman. Yes. Approval of the Commission's FY 1991 budget request will provide the necessary budgetary and personnel resources to handle the workload through FY 1991. Additional FTE's in FY 1990 and FY 1991 are and will be dedicated to preparing for the relicensing workload in FY 1991. Contract funding levels of $1.79 million in FY 1990 and $4.09 million in FY 1991 are being and will be used to complete pending EIS's and to prepare for the environmental workload associated with relicenses. A portion of staff resources is dedicated to "outreach" activities in order to better identify upcoming relicense issues, to ensure that proper studies are prepared, and, therefore, to improve the quality of future applications. These efforts should enable the Commission to shift future staff effort from the tasks of making applications acceptable for processing, to the more productive actual processing of applications. We will consider next year whether additional resources will be needed in order to process the large number of relicense applications that are due to be filed early in FY 1992.

DAM SAFETY

Mr. Bevill. What is your assessment of the safety of hydro dams under FERC jurisdiction?

Mr. Scherman. The Commission's policy considers its dam safety program a priority among its regulatory responsibilities.

Under the Commission's dam safety program, all major dams for which the Commission has dam safety responsibility have been or are in the process of being evaluated to ensure that each dam meets current engineering standards. There are currently almost 2100 dams under the Commission's jurisdiction. Of these 2100 dams, about 2000 have been judged to meet current engineering standards or have been structurally modified to do so. Currently, about 100 dams are being modified or are in the final stages of being evaluated to determine appropriate remedial measures. We also continue to evaluate all dams to ensure that they meet current engineering standards using state-of-the-art analytical and investigatory methods. Where ongoing evaluations indicate possible safety problems, interim actions such as lowering reservoir levels are implemented until final corrective measures are taken. To complement our evaluations, we also require instrumentation for monitoring the safety and performance of all major structures so that potential problems can be identified and dealt with before a safety concern arises.

In addition to evaluating the structural integrity of a dam, the Commission's staff periodically inspects all dams to ensure that the owners are properly operating and maintaining their projects. Finally, each major dam is required to have an emergency action plan in the event that there is an unanticipated sudden release of water from a dam so that downstream inhabitants and property owners can be properly warned and protected.

HYDRO REGULATORY BURDEN

Mr. Bevill. Hydro developers have complained that FERC's hydro licensing and relicensing procedures are becoming increasingly complex and burdensome and that the costs to developers of complying with environmental requirements appear to be growing. What efforts is FERC making to address these concerns?

Mr. Scherman. Complaints about complexity and burden reflect the perceived overlap of resource jurisdiction, between state/federal agencies and the Commission, in processing hydropower applications. Issues involving water quality certification under section 401 of the Clean Water Act, fishway prescriptions under section 18 of the Federal Power Act, and permits required by the Federal Land Management Policy Act, are becoming more frequent, and encumber the licensing process. Commission requests for additional information from license applicants are common. These are required, in part, by the more detailed and varied analyses that various court decisions and ECPA mandated the Commission to conduct.

The Commission has initiated several actions to minimize a hydro developer's burdens. The Commission's recent Notice of Proposed Rulemaking proposes specific time frames for governmental agencies to participate in the licensing process. Currently, agency delays in providing recommended license conditions or mandatory license or exemption conditions may cause extensive delays in the licensing process. Under the proposed regulations, the Commission would proceed with the processing of applications if an agency fails to respond in a timely fashion. The Commission has also been conducting a licensing outreach program for the past several years. Staff have been conducting workshops around the country to inform applicants, resource agencies, and the public of the licensing process and to identify and resolve issues while applications are being prepared. In support of the outreach effort, a "Relicensing Handbook" has been developed to help educate agencies, applicants, and the public on relicense activities.

CASE BACKLOGS

Mr. Bevill. The House Report accompanying the FY 1990 Energy and Water Development Appropriations Act urged the

Commission to continue its progress in reducing its backlog of pending cases and to reduce the amount of time it takes to reach final decisions on new filings. Where is the Commission making progress and where is it falling behind in its efforts to process its workload?

Mr. Scherman. During FY 1989, the Commission made substantial progress reducing its pending workload in the Hydropower Licensing and Electric Power Regulation workload areas. The number of pending filings decreased 30 percent and 15 percent, respectively.

However, for this same time period, a 28 percent increase in pending workload occurred in the hydropower project compliance and administration area. The workload was initially underestimated and the substantial increase in licensed and exempted projects has required the Commission staff to devote considerably more time and effort to this workload.

Also, because of the success of the open access transportation program, pending workload increased by 15 percent in the pipeline certificate area. Prior notice receipts have more than tripled and this level of activity is expected to continue for the foreseeable future.

Mr. Bevill. What success is the Commission having in reducing the time it takes to process individual cases?

Mr. Scherman. The Commission continues to revise its current operating procedures and implement new procedures that reduce the average length of time to process individual cases. Management improvements implemented for this purpose include reductions in the levels of management review by delegating more authority to the working levels of the organization and the reallocation of resources to the areas most needed. The Commission will continue initiatives already underway that will have an effect on the overall case processing time. These include: the automated forms initiative which speeds up both the actual filing and the subsequent review of certain natural gas casework; the major effort in hydro relicensing to assist all parties involved to prepare for the large influx of relicensing applications that will be filed shortly; and the continuation of the consolidation effort to improve even more that efficiency of our operations. We will continue as well our efforts to bring automation into the Commission in order to permit the staff to do their work more efficiently and effectively.

MANAGEMENT IMPROVEMENTS

Mr. Bevill. What actions have you taken or will you take to improve the efficiency of FERC's regulatory activities?

Mr. Scherman. Chairman Allday plans to focus much of his attention on important policy matters. His agenda for improving the way the Commission does its work includes working more closely with the states, improving and strengthening our legal efforts, and ensuring that we meet our growing environmental responsibilities in a timely manner that fully complies with the law.

Chairman Allday also plans to continue many of the initiatives started previously by the Commission. For example, the settlement policy whereby we try to resolve any differences and "settle" cases rather than go through lengthy, time-consuming formal hearing process; the automated forms initiative which allows natural gas companies to file certain forms in an electronic medium which cuts down on paper and speeds up both the actual filing and the subsequent review; and the "modernization" effort in bringing the Commission into the computer age, which will allow staff to do their work more efficiently in areas such as rate analysis, capacity and flow analysis, audit reviews, tracking of workload and documents, and preparing and issuing the many official Commission orders, opinions and decisions.

AUTOMATED OFFICE INFORMATION SYSTEM

Mr. Bevill. Several years ago FERC began installing an automated office information system at a projected cost of $8 million over three years. What progress has been made in automating FERC's office functions? Have you done so within the estimated budget and time frames?

Mr. Scherman. FERC set out to fully automate the Commission in 1987. Since then, the Commission has worked diligently using a phased implementation approach towards achieving that objective. FERC's original efforts were focused on standardizing and upgrading its word processing equipment to be in line with the Department of Energy's Automated Office Systems Support (AOSS) plan. By the end of January 1990, over 900 multipurpose professional and secretarial work stations were operational at headquarters and the Commission's five regional offices. To help achieve its automation goal and ensure that the needs of the entire Commission were represented, an Office Automation Steering Committee was established in fiscal 1987. This group of senior managers provide general guidance and oversight to the automated office information system program.

In September 1989, FERC awarded a three-year incrementally funded contract valued at $2.5 million for local area networking (LAN) technology. This contract is currently funded for FY 1990 at $500,000 and provides hardware, software, and installation services to begin the second phase of the FERC's automation program -- implementation of LAN technology throughout the Commission. In addition to acquiring LAN technology, the Commission issued an Invitation For Bids (IFB) for personal computers on January 22, 1990. The resultant contract, which is currently funded for $530,000 in FY 1990, will allow the FERC to acquire the personal computers needed to complete the first phase of its automation efforts: standardizing and upgrading of its word processing equipment. Approximately $2 million more will be needed in out years to acquire high performance workstations to support hydropower, electric, and gas professional staff via this contract. Contract award is anticipated in April 1990.

The process of competitively acquiring LAN technology and additional personal computers has extended the time frame for implementation of FERC's automated office information system beyond the original 3 year projection. To date, approximately $4.4 million has been spent on our automation efforts. An additional $3.6 million will be spent to initiate implementation of LAN technology and complete the first automation phase. Due to unanticipated technological developments subsequent to FERC's original cost estimate, additional funding may be needed in the future to support important initiatives such as the relicensing of hydroelectric facilities and the electronic filings submitted by the gas industry.

PAYMENTS TO INTERVENORS

Mr. Bevill. The annual appropriations act for energy and water development has regularly prohibited affected agencies from making payments to intervenors in their regulatory or adjudicatory proceedings. However, the courts have directed FERC in several instances to compensate intervenors for costs incurred in appealing administrative decisions to the courts. What is the current status of such payments by the Commission?

Mr. Scherman. In National Wildlife Federation v. FERC, the 1989 and 1990 appropriations language rendered moot the Commission's arguments that it was prohibited from paying intervenors for legal fees associated with their court appeals. However, the Commission persuaded the court to reduce the legal fees requested by the Federation from $17,531.25 to $5,025. This payment has been made.

In Platte River Whooping Crane Critical Habitat Maintenance Trust v. FERC, the court denied the petitioner's motion for $89,311.80 in attorney's fees when it found that petitioner was "not yet" a prevailing party since it had only succeeded in obtaining a remand to the Commission. Although the Commission is not now liable for any attorney's fees in this case, we expect that petitioner will renew its motion at a later date.

In Raton Gas Transmission Co. v. FERC, the U.S. Court of Appeals for the D.C. Circuit ordered the Commission to pay $12,268 in attorney's fees, compared to the $18,124 fees sought by Raton. The court reduced the fees requested by Raton because it found one of the Commission's two primary contentions substantially justified. This fee award has been paid.

NATURAL GAS SERVICE TO CALIFORNIA AND THE NORTHWEST

Mr. Fazio. Mr. Scherman, your budget justification discusses the expeditious processing of pipeline certificate applications for new service to California and the Pacific Northwest. Specifically, what steps are the Commission taking to expedite consideration of these applications?

Mr. Scherman. There are four pipeline certificate applications currently pending before the Commission proposing new service to California or the Pacific Northwest. One of these applications, filed by Mexus Interstate Pipeline Inc. (Mexus) on August 3, 1988, would involve various laterals in Texas, Arizona and California, which would interconnect with a proposed pipeline to be constructed in Mexico. However, more information is needed from the applicant before the Commission considers the application.

The second pending application, which was filed on March 19, 1990, by Wyoming-California Pipeline Company represents an agreement between WyCal and the California Public Utilities Commission on bringing additional service to California. WyCal has agreed to build only facilities necessary to deliver gas to local distributors in California. The environmental aspects of this proposal were examined by the Commission in an earlier proceeding and this case should be handled with minimal delay.

The two remaining cases, filed by Pacific Gas Transmission Company (PGT) and Altamont Gas Transportation Project, are being expeditiously processed in view of stated needs for additional service to these areas. Both applications have required staff data requests, the responses to which have not yet been received.

TASK FORCE ON PIPELINE CERTIFICATION

Mr. Fazio. In mid-1989, former Chairwoman Hesse appointed Commissioner Moler to lead a task force on certification policy. Has the task force made any formal recommendations to Chairman Allday or the industry on changes in the Commission's regulations? If not when might such recommendations emerge?

Mr. Scherman. Commissioner Moler's task force is performing a review of all regulations implementing the Natural Gas Act, the Natural Gas Policy Act and the National Environmental Policy Act pertaining to the construction of interstate natural gas pipeline facilities. Commissioner Moler will forward recommendations to the Chairman and the Commission when her review is completed in the near future.

CALIFORNIA PIPELINE PROJECTS

Mr. Fazio. The Kern River and Mojave Section 7(c) certificate cases have been pending the issuance of an administrative law judge's decision since 1988. The PGT and Altamont Section 7(c) certificate cases were filed before the Commission in 1988 and 1989, respectively. In the meantime, the Commission has issued optional certificates which have permitted construction to proceed on three of the five outstanding California pipeline applications -- those for Kern River, Mojave and the WyCal projects.

I commend the Commission for this action, but I am also mindful that the certification process for these pipelines has taken up to three years. Furthermore, certification of these projects does not fully address the situation in California. The supply sources of these certified pipelines is not adequate to meet all of California's long-term natural gas needs. The fact is transportation from other reliable North American sources must be included as a part of the pipeline solution for California.

As you know, 32 Members of the California delegation wrote to Chairman Allday urging that he take the necessary steps to assure that the certification process for all new natural gas pipeline capacity to California be completed during this calendar year.

Does the Commission expect that it can comply with this request? If not, what are the obstacles to completing these applications in a timely manner? Are your staff resources inadequate to permit you to meet this schedule, for example?

Mr. Scherman. The Commission is expected to consider the PGT and Altamont applications by the end of 1990, as requested by 32 members of the California delegation. However, this may not occur if the Commission determines it appropriate to set one or both of these applications for hearing. At this time, the Commission's staff is unable to determine whether such a hearing or hearings may be necessary. The Commission has committed adequate resources to act on these applications within this timeframe.

HYDRO RELICENSING PROCEDURES

Mr. Fazio. When Secretary of Energy Watkins testified before the Committee two weeks ago, he indicated his frustration with the complexity of the hydro-relicensing procedures. He indicated to the Committee that a schematic of the relicensing procedures would take up the entire hearing room wall to your left there. What effort is FERC making to reduce this complexity and time it takes to successfully relicense a hydro power plant?

Mr. Scherman. First, the schematic chart you reference, which was prepared by the National Hydropower Association, identifies the procedural steps involved not only in obtaining a Commission license but also in obtaining state water quality certification under Section 401 of the Clean Water Act, a Corps of Engineers dredge and fill permit under Section 404 of the Clean Water Act, and special use authorization from the Forest Service under the Federal Land Management and Policy Act. Authorizations pursuant to the Clean Water Act and FLPMA are outside of the Commission's proceedings. Also, authorization under FLPMA, as well as the Federal Power Act Section 4(e) process depicted on the chart, pertain only to projects on public lands and reservations, respectively, and therefore are relevant to only a minority of the Commission's pending cases. The chart moreover illustrates all the various alternative paths that an application potentially may take, whereas many applications never take all the loops shown, because, for example, the Commission adopts all the pertinent agencies' fish and wildlife recommendations, as is the case over 95 percent of the time.

Second, there are limits to the streamlining that the Commission can accomplish in the relicensing process. When the Congress enacted the Electric Consumers Protection Act of 1986, it promulgated quite specific procedures and standards for relicensing cases. Furthermore, ECPA imposed on all license proceedings, including relicensings, additional procedures and standards to ensure equal consideration of non-developmental values. The Commission's relicensing rules reflect the requirements added by ECPA. Since ECPA also requires the Commission's relicensing procedures to be expeditious, the regulations place emphasis on early consultation with appropriate resource agencies and other entities and on the early identification of information needs and licensing issues.

In March 1990, the Commission issued a Notice of Proposed Rulemaking to reorganize the regulations governing license applications. One of the objectives of the proposed rules is to establish deadlines for the submittal of license conditions by state and federal agencies. As the Commission gains experience with the new relicensing provisions, we may identify other areas where our procedures can be made more efficient while still allowing us to fulfill our statutory responsibilities.

NATURAL GAS AND ELECTRIC SUPPLY

Mr. Chapman. You note in your testimony on page 3 that during December, 1989 "the Commission's staff monitored the natural gas and electric supply situations that arose from the widespread and extremely cold weather". What role could the FERC play in making sure such shortage situations do not occur or are minimized in future cold spells?

Mr. Scherman. The December, 1989 gas supply situation was caused primarily by freeze-offs of gas wells located in the Gulf of Mexico, a major supply area for the Nation. These freeze-offs were caused by temperatures projected to occur only once in a hundred years. The Commission understands that the costs of equipping these wells to protect against such temperatures is usually not considered to be reasonably economic.

If the extremely cold weather had continued, the Commission would have started a formal monitoring program which is maintained on a stand-by status. The monitoring program would collect specific information from the jurisdictional pipelines, on a daily basis if necessary, on gas supplies, storage inventories and customer impacts.

It is not clear at this time what role capacity constraints in the delivery system may have played in the situation. In association with the Department of Energy, Commissioner Langdon is heading a task force that will look at this matter as part of an overall attempt to assess the deliverability of the Nation's natural gas system. Moreover, we are attempting to streamline the interstate pipeline certificate authorization process to see that needed pipeline expansions are expeditiously approved.

On the electric side, responsibility for emergency interconnection and electric service under section 202(c) of the Federal Power Act was transferred to the Department of Energy under the Department of Energy Organization Act. Although the Commission monitors shortages as they may relate to our rate jurisdiction and to discriminatory treatment among wholesale customers, the primary responsibility for monitoring and responding to such situations belongs to the Department of Energy.

MARKETING AFFILIATES RULE

Mr. Chapman. What was the result of the Commission's re-evaluation of the rule for standards of conduct/reporting and recordkeeping procedures of interstate pipelines' arrangements for marketing affiliates (scheduled to take place by December 31, 1989)?

Mr. Scherman. The Commission issued a final rule on marketing affiliates, Order No. 497, on June 14, 1988. That rule adopted standards of conduct and reporting requirements which became effective on September 19, 1988. The rule also established a sunset date of December 31, 1989 for the rule's reporting requirements.

On December 15, 1989, the Commission issued an order on rehearing (Order No. 497-A) that re-evaluated the provisions of the final rule. That order on rehearing: (1) clarified certain aspects of the final rule; (2) defined the types of activity that constitute marketing for purposes of the rule; (3) added two new standards of conduct, the first requiring pipelines that offer transportation discounts to affiliated marketers to make comparable and contemporaneous discounts available to all similarly situated nonaffiliated shippers, and the second requiring pipelines to maintain their books and records separately from those of their affiliates; and (4) extended the sunset date for the rule's reporting requirements to December 31, 1990.

The final rule's standards of conduct and reporting requirements, as revised in the order on rehearing, provide a disincentive for a pipeline and its affiliated marketer to engage in anticompetitive conduct. For example, because information regarding transportation by an affiliate must be made electronically available to all potential shippers on a pipeline's system, these potential shippers have a way to determine if the pipeline favored the affiliate's transportation request over a request they may have made. Additionally, the standard of conduct that requires contemporaneous disclosure to nonaffiliates of gas transportation, sales or marketing information disclosed to an affiliate should curb this sharing of insider information or at least will make the information disclosed to the affiliate available to others.

In addition, requests for rehearing of Order No. 497-A are currently pending before the Commission. All of them address new matters raised in Order No. 497-A. Producers and independent marketers continue to argue that the rule did not go far enough to prevent affiliate abuse, and that the Commission should have required divestiture, divorcement, or separation of shared personnel. Pipelines and their affiliates continue to argue that the rule is unnecessary, is overly burdensome and would force affiliates to disclose confidential information, therefore placing them at a competitive disadvantage. The Commission has not yet acted on these requests. As the final rule currently is pending review before the U.S. Court of Appeals for the District of Columbia Circuit, the Commission would have to seek leave from the court before it could take any further action.

CANADIAN GAS IMPORT PROJECTS

Mr. Chapman. At this time, how many applications are pending with the Commission to construct facilities to import Canadian gas into the United States? What is the status of these applications?

Mr. Scherman. There are 72 applications pending at the Commission related to imported Canadian gas projects. Of that, 52 involve the construction of facilities and 20 involve only the transportation of Canadian gas through existing facilities.

Often, one or more applications or amendments to applications are grouped together in a single Canadian import project, so the number of projects may be more relevant than the number of applications. The total number of Canadian import projects pending with the Commission is 34.

All of these projects are in various stages of staff review which involves public notice and comment, environmental review by way of an environmental assessment or an environmental impact statement, staff review of market data, rate design and tariffs, engineering design, contractual provisions and legal issues, and in some complex cases, settlement and technical conferences with all parties. Staff's review of these projects is expected to be completed, for the most part, in the next year, which is consistent with the requested in-service dates.

TRANSCANADA/IROQUOIS PROJECT

Mr. Chapman. With particular respect to the Transcanada Iroquois project application, concerns have been expressed regarding rate design inequities which may give the Iroquois project an uncompetitive advantage over U.S. suppliers. Does the Commission plan to hold a full hearing to fully address and, if necessary, rectify these concerns?

Mr. Scherman. Allegations of uncompetitive advantage for Canadian supplies as a result of different rate designs for U.S. and Canadian pipelines have been raised by the Independent Petroleum Association of America and other parties in several proceedings involving projects designed to bring Canadian supplies to U.S. markets. The Commission expects to address this issue in the very near future in cases which are before the Commission on rehearing and in dealing with initial rates in other pending certificate cases.

Currently, no decision has been made by the Commission to hold a formal "trial-type" hearing to address any allegation of uncompetitive advantage regarding the TransCanada/Iroquois project. The Commission has, however, already conducted an informal technical conference to permit the parties to explore this issue and articulate their respective views on rates for this project. The Commission believes that this procedure and other procedures that are available will allow the Commission to consider fully the various positions of the parties and to arrive at a proper decision.

IMPACT OF OPEN ACCESS ON SMALL LDC RATES

Mr. Chapman. What impact has the Commission seen on small distribution sales customers' rates as a result of the transition from pipeline merchant services to pipeline transportation services?

Mr. Scherman. The Commission's open-access transportation program requires pipelines to offer transportation on a non-discriminatory basis. Thus, small distribution companies have equal access to pipeline transportation services, along with fuel-switchable industrial and electric utility customers. Undue discrimination based on customer classification is expressly prohibited by the Natural Gas Act and the Commission's regulations. The Commission is not aware of any evidence to suggest that the regulations favor any class of customers over another.

Although prices to residential customers have decreased, some data indicate that fuel-switchable customers enjoy relatively lower prices for gas than captive customers. For example, the Energy Information Administration reported that in November 1989, the national average price of natural gas delivered to residential consumers was $5.56 per Mcf, compared to $2.90 per Mcf for gas delivered to industrial customers. For this same period, the average price of gas delivered to electric utilities was $2.39 per Mcf.

It should be noted, however, that the FERC does not have jurisdiction over the rates charged by local distribution companies to their retail customers. Nor does the FERC set rates for direct sales by pipelines to industrial end users. Local distribution companies' retail rates are under the purview of state and local regulatory bodies. The Commission's rate jurisdiction over a pipeline's direct industrial sales is limited by the Natural Gas Act to the transportation component of such sales.

Over the long term, competition and open-access transportation by interstate pipelines should lessen the disparity between gas prices paid by different customer groups.

To the extent that distribution companies renegotiate purchase obligations with pipelines and convert historical pipeline purchases contracts to transportation contracts, they will be in better position to purchase gas from other suppliers in a competitive environment and thereby lower their overall gas purchase costs.

However, some differences in prices between customer classes and among individual customers will probably continue into the future. This is not unreasonable, given the wide variations in purchase patterns, that is, high peak purchases by some customers versus more levelized purchases by other customers, as well as variations in purchase quantities between customer classes and among individual customers. Nonetheless, the Commission remains sensitive to the effects and implications of its policies and regulations on the small customers.

PIPELINE RATE DESIGN POLICY STATEMENT

Mr. Chapman. Since the issuance of the Commission's Policy Statement on interstate natural gas pipeline rate design, how many rate proceedings have been successfully resolved in accordance with the issues outlined in that Policy Statement?

Mr. Scherman. Since the issuance of the Policy Statement, the Commission has approved 6 settlements which addressed the issues of the Rate Design Policy Statement. In its orders approving those settlements, the Commission found that the parties had adequately addressed the issues and that the negotiated resolution was consistent with the Commission's rate design goals. In addition, there are 12 rate case settlements which propose resolution of the Rate Design Policy Statement issues that are either pending before the Commission or before an Administrative Law Judge. The remaining proceedings are in various stages of litigation or negotiation. The Commission expects the first initial decisions on a fully litigated rate design policy proceedings to be considered this summer.

PIPELINE INCENTIVE RATES

Mr. Chapman. Please outline the structure of the Commission's incentive ratemaking plan for natural gas pipelines.

Mr. Scherman. The Commission is looking at the concepts of incentive regulation. This regulatory approach would provide pipelines with a stronger incentive to lower the cost of operations and to price services more efficiently. This would be achieved by giving pipelines a stronger motivation to innovate and streamline operations by allowing them to retain a portion of any cost-savings gains they achieve. And, the pipelines' customers also benefit by receiving a share of those gains.

An example of the structure of an incentive regulatory approach would incorporate several features. First, the Commission would establish initial price caps, based on the traditional, FERC-approved, cost-based pipeline rates. The second feature would be an automatic rate adjustment mechanism. This feature would make it possible to eliminate the three-year rate review and replace it with a benchmark index to adjust the previously approved price caps. This rate adjustment mechanism would be designed to assure that pipelines and their customers share in any cost sharing and productivity gains. Third, there would be a flexible pricing mechanism. This feature would give pipelines greater latitude to design rates, within the price-cap framework, that are responsive to specific markets and services. Finally, the Commission would establish guidelines for long-term rate reviews. This feature would implement the principle that pipelines and ratepayers should share efficiency gains.

Although this is the outline of the general structure of incentive regulation, the Commission has yet to rule on, or rule out, any details of the mechanics of sharing efficiency gains or other particularities of incentive ratemaking.

TIGHT SANDS GAS INCENTIVE PRICE CAP

Mr. Chapman. Please explain the rationale for the Commission's recent decision to rescind the incentive price for tight formation gas under section 107(c)(5) of the Natural Gas Policy Act. Do you anticipate the Commission delaying the effective date for this decision, as some legislators have requested?

Mr. Scherman. In Order No. 519, issued on February 12, 1990, the Commission decided to terminate the incentive ceiling price for sales of tight formation natural gas produced from wells spudded or recompleted after May 12, 1990, and for sales of production enhancement gas where the production work is begun after that date. The Commission's rationale was generally that maintenance of the incentive ceiling price for sales of new supplies of such gas is no longer necessary to provide reasonable incentives for the production of the gas.

The Commission decided not to terminate the incentive price for tight formation natural gas sold from wells spudded or recompleted by producers on or before May 12, 1990, or for enhanced production gas where the production enhancement work was begun on or before that date. These producers relied on the continued application of the incentive price to sales of gas from these wells, and in the Commission's judgment, it would be unfair to them and disruptive to ongoing adjustments to current market conditions to eliminate the incentive ceiling prices for sales of gas from wells already spudded, recompleted or reworked. Similarly, the Commission did not remove the incentive ceiling prices for past deliveries of natural gas. Such an action would have penalized producers who relied on the incentive price rule in good faith and would have upset completed financial transactions, settlements between pipelines and producers and federal income tax credits already received.

The written requests of some legislators to delay the rule's cutoff date for spudding of new wells, after which gas from these wells could no longer qualify for the incentive ceiling price, have been placed in the public record in this docket. The Commission will consider this and all other requests for rehearing of Order No. 519 in the near future.

FY 1990 GRAMM-RUDMAN SEQUESTRATION EFFECTS

Mr. Myers. Just as with all federal agencies and programs, the Federal Energy Regulatory Commission was subject to a decrease in its FY90 appropriations as a result of sequestration imposed by the Gramm-Rudman deficit reduction law. What effect did this sequestration have on the ability of FERC to carry out its duties?

Mr. Scherman. Because on-board staffing is down since the start of the year, Commission operations have been only minimally impacted by the FY 1990 sequester of $1.6 million.

We monitor expenditures and obligations on a continuing basis to ensure that the Commission can continue to function in an efficient manner. Although a number of steps could be taken if our financial situation became more critical as the year progresses, for example, cut-backs in areas such as travel, training and non-programmatic contracts, it does not appear likely at this time that these measures will be necessary.

ELECTRIC POWER BLACKOUTS

Mr. Myers. How extensive were the rolling blackouts that parts of the nation experienced last December?

Mr. Scherman. Extremely cold weather that swept through the lower U.S. during December 1989 caused higher than expected loads and insufficient or loss of generation which caused some blackouts for electric customers in both Texas and Florida.

Texas utilities within the Electric Reliability Council of Texas (ERCOT) experienced some of their coldest temperatures in over 100 years, causing all-time peak load demands. These demands, coupled with gas supply interruption, previously scheduled maintenances, and a large number of generating unit weather-related outages, required, for the first time in ERCOT's history, the system-wide interruption of service to customers. On December 22, customers were asked to voluntarily reduce load while utilities instituted voltage reductions and dropped interruptible load. Additional generation was lost on December 23, and some utilities initiated rotating outages. Much of the firm load that was shed was restored in approximately 30 minutes. A total of over 500 MW of load distributed over several utilities had to be interrupted over about a 2-3 hour period before generation reserves were brought back to acceptable levels. It should be noted that cogeneration sources, while experiencing some of the same weather-related problems as the utilities, provided valuable assistance to ERCOT during this period.

During the same period, Florida utilities also experienced all-time peak demands that, when combined with generation unavailable due to outages or previously scheduled maintenance, initially required voltage reductions and cutting off interruptible customers. Eventually, rotating blackouts of customer loads, the first since 1983, were implemented throughout Florida for periods of up to 5 to 8 hours. Although many of these planned interruptions were limited to 15 to 30 minutes per customer per hour, many customers were affected by more than one rotation. It is estimated that up to 1 million Florida residences were affected at some time during the Christmas weekend.

Mr. Myers. What is FERC's assessment of the situation with regard to its role as a utility regulator?

Mr. Scherman. In general, we believe the U.S. can expect adequate supplies of electricity into the foreseeable future. However, two factors may affect this assessment and should be watched carefully. The first is the possibility of greater load growth than is currently anticipated. The second is what we currently perceive to be the unlikely event of lower than expected availability of non-traditional generation resources -- that is, an inability of developers to successfully complete construction and bring on line generation capacity which they contracted to build after successfully competing for the right to supply such generation. The Commission's role in assuring adequate supply is, in part, to assure that regulatory impediments are not discouraging economically desirable generation alternatives from developing.

Mr. Myers. Does regulation hamper the discovery and availability of new energy technologies in the field of electricity transmissions?

Mr. Scherman. Transmission is regulated because of its natural monopoly characteristics. It is generally thought to be inefficient for competing transmission lines to be built due to the relatively high capital costs for the equipment and scarce rights-of-way for such lines. These characteristics are likely to hold for the foreseeable future.

While in theory regulation is perceived as dampening incentives to innovate, compared to incentives found in free markets, there is no evidence of lack of incentives with respect to transmission technology. Over the last 50 years or so, technological improvements have lowered the costs of transmitting electricity and fostered the high degree of interconnected operations and trade that we see today. Moreover, we are continuing to see increased applications of new technologies to upgrade the capacity of existing lines, and we are witnessing the superconductivity breakthrough.

JUDICIAL REVIEW OF ENVIRONMENTAL COMPLIANCE

Mr. Myers. Please describe any litigation proceedings involving FERC and its compliance with environmental laws.

Mr. Scherman. The Commission's compliance with the National Environmental Policy Act, NEPA, is challenged in Public Utilities Commission of the State of California v. FERC, D.C. Circuit Nos. 89-1189, et al. and in California Department of Parks and Recreation v. FERC, 9th Circuit No. 88-7220. The Commission's compliance with NEPA, the Clean Water Act and the Electric Consumers Protection Act is challenged in National Wildlife Federation v. FERC, D.C. Circuit No. 88-1697.

TRANSITION TO WELLHEAD DECONTROL

Mr. Myers. Describe the Commission's plan to streamline the transition to complete wellhead decontrol by 1993, as mandated by the Natural Gas Wellhead Decontrol Act of 1989.

Mr. Scherman. The Commission issued a Notice of Proposed Rulemaking (NOPR) implementing the Natural Gas Wellhead Decontrol Act of 1989 in Docket No. RM89-16-000 on December 13, 1989. In the NOPR, the Commission proposed that producers would not have to file for well determinations for gas which was not subject to a first sales contract on July 26, 1989, before that gas would be deregulated and decontrolled. In addition, the Commission received comments in response to the NOPR which suggest ways to reduce regulatory burdens for gas which remains subject to the Commission's Natural Gas Act jurisdiction until 1993. The Commission is presently considering these comments and will address these matters in a final rule in the near future.

HYDRO REGULATORY BUDGET

Mr. Myers. The FY 91 budget request for the processing of hydropower applications is increased by $3.1 million. How much of the increase is a result of the Commission's duty to comply with the mandates of the Electric Consumer Protection Act?

Mr. Scherman. The budget increase, for the processing of hydropower applications, between FY 1990 and 1991 is primarily attributable to four factors: increased staff time to process more complex license applications; more detailed analyses required to make licensing recommendations; more applications requiring EIS's; and outreach efforts in preparation for relicense filings. There is some additional work due to ECPA, such as the newly established timetable for the filing of a relicense application. This ECPA requirement will cause approximately 166 relicense applications to be filed early in FY 1992. It is important to note that each Commission action under the hydropower program is pursuant to the mandates of the Federal Power Act as amended by ECPA.

Mr. Myers. Please elaborate on the environmental activities involving the Commission and its hydropower regulation program.

Mr. Scherman. In acting on license applications, the Commission, as required by the National Environmental Policy Act (NEPA), prepares an appropriate NEPA document, either an Environmental Assessment or an Environmental Impact Statement. These documents are prepared either by Commission staff or by the Commission's environmental contractor.

Mr. Myers. What percentage of the hydropower applications require Environmental Impact Statements (EIS)?

Mr. Scherman. In the last three years, approximately 15 percent of the hydropower projects that have either been granted or denied by the Commission have required an EIS.

EFFECTS OF BUDGET REDUCTIONS ON HYDRO

Mr. Myers. What would be the effect on the hydropower regulation program if the Administration's budget request could not be met?

Mr. Scherman. If the Commission's budget request for support of the hydropower program were to fail to gain approval, there would be detrimental effects in each of the major components of the program. For example, although dam safety responsibilities would continue to receive the highest priority, a reduction in funds would prevent the hiring of new inspectors and would require the rescheduling or delay of needed dam inspections. In the licensing part of the program, funding cuts would hinder staff preparations for the coming influx of relicensing applications, resulting in potential delays in the processing of a critical part of the program's workload. Similar processing delays would also occur in compliance related activities, since funding constraints would hamper staff efforts needed to deal with the largest, and fastest growing, portion of the overall hydropower workload. Beyond these effects, there likely would be less money available for contractor support to assist the staff in meeting environmental analysis requirements, so that some pending license applications and certain compliance actions could not be completed as quickly as scheduled.

FLEXIBLE PRICE OF WHOLESALE POWER

Mr. Myers. Under the Federal Power Act, the rates of long-term firm power sales are established through traditional embedded cost ratemaking. Would the Commission allow, then, for a utility to provide free access to transmission facilities in exchange for more flexible pricing of wholesale power sales?

Mr. Scherman. Under section 205 of the Federal Power Act, the Commission is charged with establishing just and reasonable rates, terms, and conditions for the sale for resale of electric energy in interstate commerce. Traditionally, the Commission has established rates for wholesale requirements service based upon the average embedded costs of providing such service. However, in situations where a utility has been able to demonstrate that it does not possess market power over the purchaser of electricity -- or has somehow mitigated its market power -- and where a meaningful price cap exists based on the purchaser's avoided cost or a variation of the seller's cost, the Commission has been willing to allow some degree of flexibility in the pricing of wholesale power sales. For example, the Commission has approved flexible pricing for certain coordination power services provided by Pacific Gas & Electric Company (PG&E) to two of its wholesale customers (Modesto and Turlock Irrigation Districts). This approval was based, in part, upon PG&E voluntarily agreeing to constrain its ability to exercise monopoly power by providing transmission service to the two customers.

It is important to note, however, that the Commission's willingness to permit flexible pricing for certain wholesale power sales has been based upon a case-specific analysis of the pricing proposal in the context of the utility's potential to exercise market power. That analysis does not focus solely upon the exercise of market power through control over transmission access, but also examines the existence of market power as to generation alternatives.

Recently, Public Service Company of Indiana (PSI) has filed with the Commission a proposal to sell 450 mw of long-term firm power at market-based rates. The rate may not exceed the purchaser's expected alternative cost for similar electric service. PSI alleges that it lacks market power with regard to all eligible purchasers. However, to further assure the Commission that it lacks market power, PSI has agreed to file a transmission tariff under which potential customers may obtain access to PSI's transmission system to transmit power from suppliers other than PSI.

In its order suspending rates and establishing procedures for its review of the PSI proposal, the Commission noted that:

> One of the Commission's primary regulatory goals is to ensure the lowest cost energy to consumers in the long run, consistent with reliable service. We believe that enhancing efficiency by competition, where appropriate, can help to achieve this goal. . . . In conjunction with the regulatory objective of encouraging greater competition, the Commission must be able to conclude that proposed market-oriented rates are just and reasonable under the Federal Power Act (FPA). To approve rates as just and reasonable, the Commission must find that they fall within a "zone of reasonableness."

The order included a preliminary staff analysis of the various market power issues raised by PSI's filing and requested comments from parties to the proceeding regarding staff's analysis. Those comments are currently being reviewed by the Commission, and we expect to act in the near future.

FEDERAL - STATE COOPERATION

Mr. Myers. In your testimony you indicate an intention on the part of FERC to work more closely with the states. What do you perceive the most effective relationship between FERC and the states to be? Does this mean a broader role in the way FERC will regulate state utilities?

Mr. Scherman. The most effective relationship between the Commission and the states is one that recognizes our mutual concerns and the complementary nature of our regulatory responsibilities. For example, the recent processing of an independent power producer, Doswell Limited Partnership, supports this notion. State and federal oversight here were complementary. The Virginia State Corporation Commission reviewed this project with respect to need, siting and organization of ownership before issuing a certificate of public convenience and necessity. FERC, on the other hand, focused on the separate issue of whether market-based rates could be accepted under the Federal Power Act's "just and reasonable" standard. The regulatory actions at the state and federal levels dovetailed smoothly.

DAM SAFETY BUDGET

Mr. Myers. The FY90 appropriation for Dam Safety and Inspections is $11.2 million. The budget request for FY91 is $12.5 million. Please justify this budget request for the Dam Safety program.

Mr. Scherman. Under Part I of the Federal Power Act, the Commission licenses non-federal hydroelectric projects. As part of that responsibility, after a license is granted, we must insure that the project is safe to operate under the conditions set forth in the license, and that it remains safe. This function is accomplished through the Dam Safety Inspection program. We currently have more than 2,000 dams that we inspect and this number increases every year as more and more projects are licensed.

In FY 1991, we plan to do nearly 2,300 inspections or about 300 more than we plan to do this year. To accomplish and keep pace with this ever increasing workload, we have increased staffing in this program by 8 full-time equivalent positions -- FTE's -- at a cost of about $400,000. Total salary costs for the 178 FTE's allocated in the budget for this program increased due to the January pay raise and increased benefits costs, also adding about $400,000. All other costs including travel, training, and overhead increased by about $500,000 from FY 1990.

PLATTE RIVER PROJECT RELICENSING

Mrs. Smith. Many people in my congressional district are up in arms over what they perceive as abuse by the Federal Energy Regulatory Commission (FERC) in considering the relicensing applications of the huge Central Nebraska Public Power and Irrigation District, which includes large hydroelectric facilities in my district.

Costs of perfecting this project's application for relicensing, filed in 1987, are approaching $10 million, according to the managers, and all FERC has done has issued what I would regard as a highly questionable interim license filled with conditions not authorized by law. How much longer is FERC going to take to issue a new long-term license?

Mr. Scherman. The relicense applications were filed on June 21, 1984 and found deficient because they did not comply with the Commission's regulations. The licensees are expected to file engineering and environmental data and analyses in May 1990, to correct the deficiencies. If the applications are acceptable, the Commission's staff will determine whether to prepare an environmental impact statement in order to prepare the licenses for Commission action. This processing would take approximately two years from the date acceptable applications are filed.

INTERIM LICENSE CONDITIONS

Mrs. Smith. In light of the present law, which is Section 15(a) of the Federal Power Act, how does FERC justify imposing new license conditions in interim licensing when the law says ..."the Commission shall issue from year to year an annual license to the then licensee under the terms and conditions of the existing license..."?

Mr. Scherman. Since Section 15(a) of the Federal Power Act provides that an annual license shall have the same terms and conditions as the expired license, the annual license provides the Commission with the same authority to impose new conditions as did the expired license. The Federal Power Act does not preclude amendments to an annual license, either through the mutual agreement of the Commission and the licensee or through use of a reservation in the annual license of the Commission's authority to impose such amendments.

AVOIDANCE OF COSTS AND DELAYS

Mrs. Smith. I know you cannot go into the merits of this relicensing case formally pending before FERC, but I ask you how could this enormous expenditure and time delay have been avoided?

Mr. Scherman. A great deal of time has been spent, and is continuing to be spent, by the licensees in gathering and submitting information necessary for the Commission to make an informal decision in the relicensing applications filed in 1984. On December 7, 1984, the Commission staff notified the licensees that their new license applications were deficient and gave them 90 days to correct the deficiencies. The licensees responded to the Director's letter on March 7, 1985, correcting some of the deficiencies and requesting an extension of time to submit the remaining information until completion of the Platte River Management Joint Study. The purpose of the Joint Study, undertaken by the Fish and Wildlife Service and the Bureau of Reclamation, was to develop a fish and wildlife management plan for the Platte River system in central Nebraska. On January 27, 1986, the licensees were granted an extension of time to submit the required information until 120 days after completion of the Joint Study. The 1987 completion date of the Joint Study was extended due to federal funding cuts.

On June 30, 1987, the Commission issued an order which reviewed the slow progress of information gathering for the relicense applications, and gave the licensees a new deadline of May 5, 1990, to gather the necessary data and submit corrected applications. To ensure that the licensees would continue to gather the required information as expeditiously as possible, the rehearing order required the licensees to prepare and submit to the Commission quarterly reports indicating the progress that has been made toward completion of the necessary studies.

Had the licensees initially filed acceptable applications or promptly corrected the deficiencies identified by staff, there would have been only minor delay.

Mrs. Smith. Is this typical of the experience of other hydroelectric applicants for relicensing?

Mr. Scherman. I do not consider the experience associated with the relicensing of the Central Nebraska Project to be "typical". The originally filed applications were incomplete and have taken a great deal of time to make them acceptable for processing. In addition, the Central Nebraska Project is a complex project involving a large geographic area, affecting threatened and endangered species, and involving intense competition among resources for uses of the water.

HYDRO LICENSING PROGRAM

Mrs. Smith. How many hydroelectric facilities in the United States are required to have federal licenses?

Mr. Scherman. The Commission currently has 1,078 hydropower projects under license. These projects are required to be licensed because they are non-federal hydroelectric projects that either: are located on navigable waters of the United States; are on nonnavigable waters over which the Congress has commerce clause jurisdiction, construction has taken place since 1935, and the project affects the interests of interstate and foreign commerce; are on public lands or reservations of the United States; or utilize the surplus water of water power from a federal dam.

There is an additional undetermined number of operating hydroelectric projects that have yet to obtain the required licenses.

Mrs. Smith. How many of these licenses are expiring--in other words, what is your case load, beginning in whatever year these relicensing applications become significant to FERC and projecting into the future?

Mr. Scherman. A total of 228 licenses will expire during the 1990's. The largest number of license expirations, 166, will occur before December 31, 1993, and relicense applications must be filed for these projects by December 31, 1991.

Mrs. Smith. How many hydroelectric facilities have been relicensed by the federal government over this period?

Mr. Scherman. Between January 1, 1980, and March 1, 1990, a total of 97 projects have been relicensed.

Mrs. Smith. What is the typical length of time it takes for a hydroelectric facility to receive a new long-term license?

Mr. Scherman. Between January 1, 1987, and January 5, 1990, 38 relicenses were granted. The average processing time for these applications, from filing date of the application to issuance date of the new license, was 2.8 years.

Mrs. Smith. Are all the new terms for 50 years?

Mr. Scherman. Although the maximum term of license allowed by the Federal Power Act is 50 years, this term is not typical for relicenses.

Mrs. Smith. If not, what terms are specified typically in the new licenses?

Mr. Scherman. Section 15(e) of the Federal Power Act, as amended by the Electric Consumers Protection Act, requires that any license issued by the Commission under this section shall be for a term which the Commission determines to be in the public interest but not less than 30 years nor more than 50 years from the date on which the license is issued. The periods vary depending upon the amount of project rehabilitation and new development proposed. The Commission's general practice is to issue new licenses for a term of 50 years when the project would be totally redeveloped. A term of 40 years is given when there would be a moderate amount of new development, and a 30-year term is given when there would be no new development at the project.

INTERIM CONDITIONS IN ANNUAL LICENSES

Mrs. Smith. Even where there is a so-called "license reopener" clause in the license which might arguably give FERC the right to impose additional conditions, it seems to me that Section 6 of the Power Act imposes some limits on that. One of the primary purposes of the Power Act when it was enacted in 1920 was to give licensees a security in their investment in order to encourage private development of hydroelectric resources. Doesn't it defeat the purpose of Section 6 for FERC to be able to include unlimited "reopener" clauses in licenses?

Mr. Scherman. Reservations of authority--"reopener clauses"--should not be unlimited. However, the courts have recognized that, when the Commission reasonably foresees the possibility that there could arise a need for license conditions that cannot be specified at present, it is sufficient, under Section 6 of the Federal Power Act, to include in the license a reservation of authority to address the matter in the future, subject to the licensee's right to test the validity of any future action taken.

Mrs. Smith. I understand there is at least one case where there is no "reopener" clause, but there FERC has attempted to persuade the licensee to "voluntarily" agree to accept interim license conditions. Is there not a danger that FERC will use its leverage in such cases to put pressure on licensees to accept interim conditions, and thereby forfeit their rights under the license, or run the risk of less favorable regulatory treatment later on at relicensing?

Mr. Scherman. The only case of which I am aware involving a Commission request for a licensee's voluntary agreement to interim conditions concerns Central Nebraska Public Power and Irrigation District's Kingsley Dam Project No. 1417. In that proceeding, the U.S. Court of Appeals for the District of Columbia Circuit reversed Commission orders denying the request of certain intervenors to impose environmentally protective conditions in the annual licenses for Project No. 1417 and for Nebraska Public Power District's interrelated North Platte/Keystone Diversion Dam Project No. 1835. The court stated that, in light of the existing information regarding the potential harm to the whooping crane of operation of the projects pending relicensing, the Commission should have assessed the need for interim measures to prevent irreversible environmental damage pending relicensing.

On remand, the Commission issued an order on February 14, 1990, in which it imposed on Project No. 1835, pursuant to authority reserved in the license, interim conditions to prevent irreversible environmental damage pending relicensing. Since the Project No. 1417 license did not contain a similar reservation of authority, the Commission could only "strongly encourage" the licensee to consent to the interim conditions, citing to their temporary nature and their importance to the natural resources in question. The licensees and other parties have filed requests for rehearing of the February 14 order.

I believe that it is reasonable for the Commission to encourage a licensee to agree to interim conditions that the Commission has found are in the public interest because they would prevent irreversible environmental damage pending relicensing. Whether a licensee who does not agree to adopt such conditions risks "less favorable regulatory treatment later on at relicensing" is an issue that cannot be prejudged. Section 15(a)(3)(B) of the Federal Power Act, as amended by the Electric Consumers Protection Act of 1986, requires the Commission, when reviewing a relicensing application, to consider, among other things, "the actions taken by the licensee related to the project which affect the public." What this provision encompasses must be determined on a case-by-case basis.

Mrs. Smith. One other serious problem with FERC imposing interim conditions which has been brought to my attention is a lack of notice and due process to other parties who might be affected by those conditions. For example, there could be other water users, such as irrigators or municipalities who rely on a project for water supply, or people who fish and boat on the reservoir, who could be adversely affected by conditions requiring increased downstream minimum flows. What opportunities are there for such potentially affected persons to participate in the process of setting interim conditions? If the views and concerns of these people are not heard how can the Commission really give "equal consideration" to irrigation, water supply, and other values as the Power Act requires it do to?

Mr. Scherman. As I noted in my previous answer, there are currently pending before the Commission requests for rehearing of the Commission's February 14 order formulating interim conditions. Because your question involves issues that have been raised on rehearing, I am unable to respond at this time. When the Commission issues its order on rehearing, I will forward to you a copy of the order.

Mrs. Smith. As a policy matter and perhaps as a matter of due process, does it make sense for FERC to impose conditions which, although labeled "interim," could have irreversible effects on the licensee, on other parties, and on the environment, without developing the full record that will be developed in the course of completing the relicensing process?

Mr. Scherman. I am unable to answer this question, as it involves issues that have been raised in the rehearing requests I have referenced.

Mrs. Smith. Is there any justification for interim conditions which go beyond preserving the status quo, and actually require new measures for resource mitigation and enhancement?

Mr. Scherman. Since this question, too, involves questions pending before the Commission on rehearing, I cannot answer it at this time.

IMPACTS OF FY 1990 SEQUESTRATION

Mr. Conte. What impacts has sequestration had on the operations of the Commission during Fiscal Year 1990? Please describe and quantify these impacts.

Mr. Scherman. The impact of the FY 1990 sequestration on the Commission has been minimal. Since on-board staffing has been down since the beginning of the year, it has been possible to absorb the impact of our $1.6 million budget reduction pursuant to sequestration without adversely affecting critical operations.

PROGRAMS TO ADDRESS ILLEGAL DRUG USE

Mr. Conte. Does the Commission conduct any programs or activities designed to prevent, eliminate, or reduce the use of illegal drugs? Please describe any such programs and quantify their costs and effects.

Mr. Scherman. The Commission is in the process of establishing a drug testing program under the Drug Free Federal Workforce Program mandated by Executive Order 12564. The Commission's proposal is currently before the Secretary of Health and Human Services for certification to the Congress for approval. The program encompasses the full range of drug testing promulgated by the Executive Order, as well as mandatory supervisory training and employee outreach efforts. First year operational costs are budgeted at $30,000.

The Commission's Employee Assistance Program -- EAP -- is currently used to address drug and alcohol related problems which are manifested at the work site. During fiscal year 1989, the EAP was conducted by a private firm at FERC headquarters and the U.S. Public Health Service at our regional offices. The combined FY 1989 cost was $25,000 and encompassed 138 cases, of which only 5 were non-alcohol related drug cases.

STATUS OF IROQUOIS PROJECT

Mr. Conte. Please describe the current status of the effort by the Iroquois Gas Transmission System to import new supplies of Canadian natural gas to the northeast United States by means of a new natural gas pipeline.

Mr. Scherman. The Commission's consideration of the Iroquois/Tennessee project is awaiting development of a complete record upon which it will decide whether the proposed project, or parts thereof, should be authorized. Our efforts thus far have been focused on examination of the environmental aspects of the proposed project. A draft environmental impact statement on the original proposal was issued on November 13, 1989, and we are in the process of evaluating comments on that document. In addition, the Commission staff is evaluating the non-environmental issues and comments raised by interested parties.

On November 20, 1989, the Commission staff convened a rate technical conference to allow the project sponsors and interested parties to provide their views on the proposed rates in the project. At this conference, Iroquois announced that it would be filing an amendment to its certificate application to reflect the deletion of five shippers and the addition of three other shippers. This amendment was filed on December 29, 1989. In addition, Tennessee, another project participant, on January 26, 1990 filed an amendment and a system expansion to reflect downstream deliveries for the new Iroquois customers through additional facilities. These new facilities may raise environmental matters necessitating further review by the Commission and interested parties.

Mr. Conte. What remaining procedural steps must be taken before the Commission could issue a Certificate of Public Convenience and Necessity for the pipeline?

Mr. Scherman. The Commission Staff is currently reviewing the comments received from interested parties as a result of the issuance of the Draft Environment Impact Statement. Review of these comments and issuance of a Final Environmental Impact Statement are expected to be completed by June 1990. During this time, the Commission's staff will finalize its recommendation on the non-environmental issues associated with Iroquois.

Mr. Conte. When is the earliest such a certificate could be issued?

Mr. Scherman. Based on the current workload, it is possible that the Commission could consider the certificate application as early as June 1990.

ACE-FEDERAL REPORTING CONTRACT

Mr. Conte. On February 15, 1990, the Washington Post reported that FERC rejected a bid for court reporting services from Ace-Federal Reporters, Inc. earlier that month. According to the report, Ace-Federal had offered to pay FERC $1.2 million over five years for the court reporting contract. The report suggested that the bid was rejected because the administrative burdens of accepting such a "bonus bid" are too great. Is the report accurate? Has the contract in question been awarded?

Mr. Scherman. On March 30, 1990, the U.S. District Court for the District of Columbia issued an order which, among other things, remanded this matter to FERC for further consideration consistent with the Court's order and memorandum. I will submit a copy of the court's order for the record.

The Court's March 30 order followed an earlier February 28, 1990, preliminary injunction order from Judge John Garrett Penn that had the effect of temporarily retaining Ace-Federal as the contractor. The Commission is now in the process of evaluating the Court's March 30th ruling to determine what steps to take concerning the court's ruling and the contracts to provide stenographic services. Therefore, it would be inappropriate to comment any further on the specifics of this matter. However, I have submitted to the Subcommittee a copy of the Commission's filing with the Court, which addresses the issues raised by your questions.

It is worth noting that a great deal of attention in this case has been focused on a statement by a Commission contracting employee who indicated in a letter to GAO that a bonus bid was of no benefit because the money would have to be turned over the general fund of the Treasury. This issue is a red herring. That statement was a personal opinion by the individual employee and was later withdrawn. It is not the position of the Commission and played no role in any contracting decision in this case.

(The March 30, 1990, order of the U.S. District Court for the District of Columbia follows:)

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

ACE-FEDERAL REPORTERS, INC.,

Plaintiff,

v.

Civil Action No. 90-0287

THE FEDERAL ENERGY REGULATORY
COMMISSION,

FILED
MAR 30 1990
CLERK, U.S. DISTRICT COURT
DISTRICT OF COLUMBIA

ORDER

For the reasons discussed in the accompanying Memorandum, the Court concludes that the FERC and Ann Riley's, respective, motions for summary judgment must be denied, and Ace-Federal's cross-motion for summary judgment should be granted in part and denied in part. This Court further concludes that this case should be remanded to the FERC to determine which contractor provided the most advantageous bid to the First Solicitation.

It is hereby

ORDERED that the FERC and Ann Riley's, respective, motions for summary judgment is denied, it is further

ORDERED that Ace-Federal's cross-motion for summary judgment is granted in part and denied in part, it is further

ORDERED that this case is remanded to the Federal Energy Regulatory Commission.

Date MAR 30 1990

JOHN GARRETT PENN
UNITED STATES DISTRICT JUDGE

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

FILED
MAR 30 1990
CLERK, U.S. DISTRICT COURT
DISTRICT OF COLUMBIA

ACE-FEDERAL REPORTERS, INC.,

Plaintiff,

v.

Civil Action No. 90-0287

THE FEDERAL ENERGY REGULATORY
COMMISSION,

MEMORANDUM

Plaintiff, Ace-Federal Reporters, Inc. ("Ace-Federal"), an unsuccessful bidder for a government contract to provide stenographic services[1], filed this action for declaratory and injunctive relief to enjoin the Federal Energy Regulatory Commission ("FERC") from awarding the stenographic services contract, to any entity other than the plaintiff. On February 28, 1990, this Court granted plaintiff's preliminary injunction in order to maintain the status quo until the Court had an opportunity to consider the merits of the case. See Memorandum Order filed February 28, 1990. This matter is now before the Court on cross-motions for summary judgment.[2]

I.

The underlying facts are as follows. FERC, acting through its Division of Procurement, issued Solicitation No. DE-FB89-RC-00001 (the "First Solicitation") for stenographic services on August 25, 1989. The First Solicitation was issued as an Invitation for Bids (IFB) to provide stenographic reporting services at FERC for one year, from October 1, 1989 through September 30, 1990, with four one-year option periods thereafter. The stenographic services contractor receives revenue from the sale of transcripts to the public. Such sales fully defray the cost of performance and FERC has not made any payment for stenographic services in, at least, the last eight years. Plaintiff represents that FERC expected that the First Solicitation would result in "no charge" bids, and in fact four of the six bids from five vendors responding to the First Solicitation offered "no charge" to FERC. Plaintiff submitted two bids, one bid offering to make payments in the amount of $.05 per page for the life of the contract, this bid being a so-called "bonus bid" and the alternative bid was one offering "no charge". Plaintiff alleges that its "bonus bid" offered the price most advantageous to the government and that as a result plaintiff expected to receive the award. Instead, the Contracting Officer cancelled the First Solicitation by issuing Amendment No. 2 on September 27, 1989. The amendment stated that the First Solicitation was "cancelled in its entirety due to ambiguities in the Invitation for Bids."

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[1] Ace-Federal is also the incumbent contractor.

[2] Motions for summary judgment were filed by the FERC, as well as intervenor Ann Riley & Associates, Ltd. ("Ann Riley"). The Court granted Ann Riley's motion to intervene as a defendant. See Order filed February 21, 1990.

Plaintiff contends that FERC's determination to cancel the First Solicitation lacked any compelling justification and did not meet any of the criteria set forth in the applicable statutes and regulations governing the cancellation of a solicitation. It asserts that the action cancelling the solicitation was arbitrary and capricious and an abuse of discretion. On October 12, 1989, the plaintiff filed a timely protest with the General Accounting Office (GAO) objecting to the cancellation of the First Solicitation. GAO denied the protest on February 2, 1990.

On November 30, 1989, while the GAO protest was still pending, FERC issued a Second Solicitation for the same services, Solicitation No. DE-FB90-RC-00009 (the "Second Solicitation"). The plaintiff contends that the Second Solicitation did not prohibit bids offering payments to the government and specifically encouraged creative alternatives through its Provision L.12. Prior to amendment, Provision L.12 read: "Alternate bids submitted within the scope of this solicitation will be considered." By Amendment No. 1, plaintiff alleges that FERC changed its position and refused to consider "bonus bids" offering payments to the government. That amendment reads as follows:

> Under Section L. Instructions Conditions and Notices to Offerors, page 63 of the basic solicitation, Item L.12. Alternate Bids, add to the heading "and Bonus Bids". At the end of the sentence under the heading add the following new sentence: "Bonus bids, including offers of additional sums to be paid to the Government, will not be considered."

Plaintiff thereupon filed a second protest with the GAO based upon its contention that FERC violated the statutory and public policy requirements in that it included provisions in the Second

Solicitation that among other things refused to consider bonus bids.[3]

Amendment No. 4 to the Second Solicitation was published and plaintiff contends that Amendment No. 4 removed the prohibition against submitting bonus bids. Amendment No. 4 reads as follows:

> The purpose of this amendment is to delete provision L.12, entitled Alternative Bids, and substitute the provisions L.12, entitled Alternate Proposal Information. In addition, this amendment will incorporate 90 days in Block 12 of the Standard Form 33, which was inadvertently left out. Accordingly.
>
> 1. Provision L.12 shall read:
>
> > L.12 - ALTERNATE PROPOSAL INFORMATION, Alternate proposals are not solicited, are not desired, and shall not be evaluated.

Plaintiff submitted a bonus bid substantially in excess of its original bid in which it offered to pay FERC approximately $1.25 million dollars over the five-year life of the contract for the privilege of providing stenographic services to the agency. FERC opened the bids pursuant to the Second Solicitation on February 5, 1990. None of the other bidders offered to make any payments to provide the services. Plaintiff alleges that its bid was the most advantageous to the government but FERC did not accept plaintiff's bid. By letter dated February 9, 1990, FERC informed plaintiff that its bid was rejected because it contained a bonus provision. The letter also stated that a lottery would be held among those contractors submitting "no charge" bids. The lottery was held and was won by Ann Riley.

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[3] In view of this Court's decision to address the case on the merits after briefing by the interested parties, see Memorandum Order filed February 28, 1990, the GAO, through counsel, has informed the Court that it will stay its resolution of plaintiff's second protest.

II.

Summary judgment is proper where "the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(c). There is no issue for trial unless there is sufficient evidence favoring the non-moving party for a jury to return a verdict for that party. Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 106 S.Ct. 2505 (1986). The Court concludes that there are not issue of material fact to preclude a judgment as a matter of law.[4]

III.

A party challenging the legality of procurement decisions "bear[s] a heavy burden of showing either that (1) the procurement official's decisions on matters committed primarily to his own discretion had no rational basis, or (2) the procurement procedure involved a clear and prejudicial violation of applicable statutes or regulations." Kentron Hawaii, Ltd. v. Warner, 480 F.2d 1166, 1169 (D.C. Cir. 1973). The initial issue before this Court is whether the contracting officer had a "rational basis" to cancel the First Solicitation.

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[4] The parties agree that this case is ripe for a ruling on cross-motions for summary.

> Preservation of the integrity of the competitive bid system dictates that, after bids have been opened, award must be made to that responsible bidder who submitted the lowest responsive bid, unless there is a compelling reason to reject all bids and cancel the invitation.

48 C.F.R. §14.404-1(a)(1 (emphasis the Court's). "Invitations may be cancelled and all bids rejected before award but after opening when, consistent with paragraph (a)(1) above, the agency head determines in writing that [among other things]- (1) Inadequate or ambiguous specifications were cited in the invitation. 48 C.F.R. §14.404-1(c)(1). The Court further notes that "contracting officers should be allowed wide latitude to exercise business judgment." 48 C.F.R. §1.602-2.

IV.

The Contracting Officer ("CO") asserts that after the August 25, 1989, First Solicitation, "several problems became apparent." Declaration of James E. Thompson[5], Exhibit A to FERC's Motion For Summary Judgment ("Thompson's Declaration"). The problems stated were (1) the omission of a clause requiring bid and performance bond; (2) the omission of an organizational conflict of interest clause; (3) the non-compliance with a requirement that quarterly sales reports be submitted to the Commission pursuant to the existing contract for stenographic services with Ace-Federal; (4) the fact that the contract did not reflect recent legislative and regulatory changes, particularly the Services Contract Act; and (5) the solicitation did not include a clause referring to the potential loss of exhibits by a stenographer. Id.

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[5] Mr. Thompson is the Director of the division of Procurement. His declaration, date November 20, 1989, was submitted to the GAO in response to Ace-Federal's protest.

Plaintiff argues that the reason FERC cancelled the First Solicitation was that FERC did not consider Ace-Federal's bonus bid as an inducement since the money would have to be turned over to the Treasury. Ace-Federal's Memorandum In Support of the Cross Motion for Summary Judgment and Consolidated Response in Opposition to the Motions for Summary Judgment of the FERC and Ann Riley ("Ace-Federal's Cross Motion") at 9. Ace-Federal points out that the "determination and findings" that were issued by FERC on September 26, 1989, at the time the decision was made to cancel the First Solicitation states that:

> The Contracting Officer has determined that the apparent disparity in bids submitted by the five firms indicates that the specifications in the invitation for bid are ambiguous, and, therefore, recommends the cancellation of this solicitation, and clarification and resolicitation of these requirements.

Id. at 8, Exhibit A. Plaintiff further notes that "in response to Ace-Federal's First Protest on October 13, 1989, the contracting officer stated that the bids of Ace-Federal were not considered responsive since there was no provision in the First Solicitation permitting alternative bids," and further the CO "questioned the 'legality of Ace-Federal's offer of payment to the Government of five cents per original page.'" Id. at 9.[6]

FERC later stated that Ace-Federal's offer to pay the FERC five cents per original page was responsive to the solicitation and was not prohibited by either the terms of the solicitation or the FAR. Id., See Ace-Federal's Memorandum for Preliminary Injunction, Exhibit C at 2. Finally, Ace-Federal concludes that "once it realized that the original justification for cancelling the solicitation was improper, the FERC began an intensive search for some way to justify its cancellation decision." Ace-Federal's Cross Motion at 10. On November 20, 1989, the FERC further responded to the first GAO protest and attempted to justify the original cancellation decision. Id., See Ace-

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[6] The letter from Mr. Thompson dated October 13, 1989, states in pertinent part:

> You are also advised that the decision to cancel the solicitation was made jointly by the Contracting Officer and the Head of the Contracting Agency (HCA), base on Federal Acquisition Regulation (FAR) 14.404-(c)(1).
>
> Further, (based on my reasonable judgment) the bid of Ace-Federal Reporters, Inc. was not considered responsive, since there was no provision in the solicitation for either permitting or accepting alternate bids or add-ons (extras)-- FAR 14.404-2(b) and (d).
>
> The legality of Ace-Federal Reporters offer of payment to the government at five cents per original page is questionned [sic]. In addition, this was no inducement, since any money FERC might have received would have been deposited in the general funds of the U.S. Treasury, rather than accrue to FERC's benefit.

Ace-Federal's Motion for Temporary Restraining Order and for Preliminary Injunction ("Ace-Federal's Memorandum for Preliminary Injunction"), Exhibit A.

Federal's Memorandum for Preliminary Injunction, Exhibit B.

Ace-Federal argues that the November 20, 1989 reasons for the cancellation are post hoc rationalizations and should be ignored. Ace-Federal's Cross Motion at 10.[7] Ace-Federal further argues that "even if the FERC's post hoc rationalizations were permitted, however, they would not provide a compelling reason for cancellation of the First Solicitation. The Court will address each of the reasons given by FERC for the cancellation.

A.

First, the omission of clauses requiring bid and performance bonds. The regulations provide that "performance bonds may be required when necessary to protect the Government's interest." 48 C.F.R. §28.103-2(a)(emphasis the Court's). Accordingly, there is no mandatory requirement that there be a performance bond. The CO stated that "since the Solicitation did not contain these two bond requirements, there was no protection for the government in the event of contractor default." Thompson's Declaration par. 10. Ace-Federal points out that in the Second Solicitation, FERC indicated that the contractors would be required to provide a $10,000 bid and performance bond. Ace-Federal's Cross Motion at

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[7] The parties dispute whether the review of alleged post hoc rationalization should be precluded in a procurement case. The Court has noted earlier that its review is to determine whether the CO had a "rational basis" to conclude that "compelling reasons" justified cancellation of the First Solicitation. In making this determination the Court will review the whole record, the Court need not determine whether the reasons are post hoc, but must determine whether the record supports the finding that the CO had a "rational basis" for his decision.

12. Ace-Federal argues that "[t]he insignificance of the bonds is demonstrated by the trivial bond amounts sought in the Second Solicitation." Id.

The failure to provide the performance bond could have been remedied by requiring the successful bidder to provide such a bond. see Ace-Federal's Memorandum for Preliminary Injunction, Exhibit E.[8] Further, the Court must agree with Ace-Federal that the low amount of the bond in the Second Solicitation, does suggest that the lack of the bid and performance bond was not a major concern for FERC.

B.

Second, the omission of an organizational conflict of interest clause. Ace-Federal contends that the First Solicitation did, in fact, incorporate an organizational conflicts of interest provision on page 32. Id. at 15, referring to FERC's Motion for Summary Judgment, Exhibit G. The Court notes upon review of the First Solicitation, that on page 32 the contract incorporates by reference the Organizational Conflicts of Interest- General (APR 1984), DEAR 952.209-71.[9] The CO states

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[8] In Haraco Corp., B-236777 dated December 13, 1989, the Comptroller General ruled that contracting officers have the discretion to award a contract under a deficient solicitation only if doing so "would serve the actual needs of the government."

[9] The DEAR refers to the Department of Energy Acquisition Regulation, with Title 48, the Federal Acquisition Regulation System, of the Code of Federal Regulation.

"[t]he Solicitation also omitted a conflict of interest clause." Thompson's Declaration par. 11. However, upon review of the record it is clear that the CO's statement is incorrect. Ace-Federal further notes that "[i]n the second solicitation the FERC merely added a demand that offerors certify their compliance with this same provision." Ace-Federal's Cross Motion at 15.

The Court notes that neither FERC or Ann Riley respond in their briefs to plaintiff's argument regarding the existence of the conflict of interest clause. The failure to have a conflict of interest clause could not be a compelling reason to cancel the First Solicitation, because such a clause was, in fact, in the First Solicitation.[10]

C.

Third, the non-compliance with a quarterly sales reporting requirement. It is undisputed that Ace-Federal, the incumbent contractor, did not file the quarterly sales report with the Commission as required by the existing contract. Ace-Federal contends that the requirement was informally waived. The CO states that "no member of my procurement staff recalled orally waiving this requirement." Thompson's Declaration par. 8. He notes that Ace-Federal is unable to specify when the report was waived or who had waived it. Id. The CO states that he "realized that the quarterly report requirement in the contract did not reflect the needs of the government nor the reality of the administration of the contract for stenographic services." *Id*.

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[10] The Court notes that the CO does not state that the conflict of interest clause on page 32 was inadequate, but states that there was no clause.

Ace-Federal states that "[t]o remedy this supposed confusion, the Second Solicitation merely stated that quarterly reports would not be submitted except when requested by the contracting officer. The Court notes that the failure to provide quarterly reports would put the other bidders at a disadvantage to the incumbent bidder, in this case Ace-Federal. However, in view of the manner FERC remedied the lack of quarterly reports, the Court must question whether the lack of quarterly reports could serve as a compelling reason to cancel the First Solicitation. Notwithstanding the issue of waiver, the Court notes that the FERC never requested the reports before, or after the First Solicitation. It appears that during the Second Solicitation, the other bidders were still at the disadvantage they were in during the First Solicitation.

D.

Fourth, the fact that the contract did not reflect recent legislation. Ace-Federal contends that "the only item relating to the requirement of the Service Contract Act that was missing from the First Solicitation was the as then unissued Department of Labor wage determination for labor categories covering stenographic services." Ace-Federal's Cross Motion at 14. The First Solicitation did provide that "The government has requested a Department of Labor wage determination for the labor categories identified herein. It will be attached to the negotiated contract." FERC's Motion for Summary Judgment, Exhibit G. Ace-Federal states that "[i]n the Second Solicitation, issued by the FERC on November 30, 1989, the only change relating to the Service Contract Act was the inclusion of the by then issued wage rate determination as an attachment." Ace-Federal's Cross Motion at 14. Ace-Federal argues that the absence of this wage rate determination from the First Solicitation cannot be viewed as a compelling reason to cancel the solicitation because all bidders were on notice that they would be required to comply with the wage determination once it was issued.

E.

Finally, the solicitation did not include a clause referring to the potential loss of exhibits by a stenographer. Ace-Federal submits the First Solicitation contained three separate provisions for safeguarding data. Id. at 16. The first was contained at page 17, provision F.9, entitled "Delivery of Stenographic Notes"; the second was contained at page 23, provision H.3, entitled "Stenographic Notes"; and the third was contained at page 27, provision H.17, entitled "Confidentiality of Information." Ace-Federal argues that the additional sentence in the Second Solicitation only repeated the more detailed requirements which existed at page 23, provision H.3 of the First Solicitation.

V.

Upon review of the record in this case the Court questions whether the reasons given in the CO's November 20, 1989 declaration are the actual reasons for cancelling the First Solicitation. The reasons given in the November 20, 1989 declaration are not consistent with the reasons stated by FERC on September 26, 1989 or in the October 13, 1989 letter. Moreover, upon review of the reasons set forth in the November 20, 1989 declaration, none of the reasons, individually, or together, would justify a compelling reason to cancel the First Solicitation. The Court acknowledges that the "CO should be allowed wide latitude to exercise business judgment," *see* 48 C.F.R. §1.602-2; however, here the CO has abused his discretion and there was no rational basis to cancel the First Solicitation.[11]

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[11] Ann-Riley states "[a]lthough Comptroller General decisions are not binding on the Court, federal courts in the District of Columbia Circuit have repeatedly stated that they are reluctant to interfere with the federal procurement process when the Comptroller General has made a determination. *M.Steinthal*, 455 F.2d at 1304, 1305; *Wheelabrator Corp.* v. *Chafee*, 455 F.2d 1306, 1317 (D.C. Cir. 1971). Ann-Riley's Memorandum In Opposition to Plaintiff's Cross-Motion for Summary Judgment and Consolidated Reply to Plaintiff's Opposition to Defendants' Motion for Summary Judgment at 19, n.5. However, this Court concludes that the record is clear that the CO had no rational basis to cancel the First Solicitation; therefore, the Court will not uphold the Comptroller General. The Court further notes that the Comptroller General's decision was based on determining whether the omission of the bid and performance bond was a compelling reason to cancel the First Solicitation, and did not review the record before this Court. *See* FERC's Motion for Summary Judgment, Exhibit F.

VI.

Ace-Federal additionally request that this Court conclude that is should be awarded the contract. "It is undisputable that the ultimate grant of a contract must be left to the discretion of a government agency; the courts will not make contracts for the parties." Delta Data Systems Corp. v. Webster, 744 F.2d 197, 204 (D.C. Cir. 1984)(citing Scanwell Laboratories, Inc. v. Shaffer, 424 F.2d 859, 869 (D.C. Cir. 1970). "It follows that a court may not order the award of a contract unless it is clear that, but for the illegal behavior of the agency, the contract would have been awarded to the party asking the court to order the award." Delta Data Systems Corp. v. Webster, 744 F.2d at 204 (D.C. Cir. 1984).

This Court cannot conclude that, but for the action of the agency, plaintiff would have been awarded the contract. Although, the FERC conceded that plaintiff's bonus bid was responsive to the solicitation, the agency has not been given the opportunity to determine which contractor provided the most advantageous bid.[12] Accordingly, the case should be remanded to the agency to determine which contractor provided the most advantageous bid. In determining which contractor should be awarded the contract, the FERC must do so by "considering only price and the price-related factors included in the invitation." 48 C.F.R. §14.407-1(a)(3), see also §14.201-8.

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[12] The Court notes that in Post-Conference comments the FERC does indicate that in a hypothetical, if it were to determine which contractor provided the most advantageous offer, it would draw a lottery between Ace Federal, Ann Riley, and Executive Court Reporters, Inc. Ace-Federal's Motion for Preliminary Injunction, Exhibit C. However, that was not an actual finding by the agency. In the hypothetical, the FERC had concluded that Ace-Federal's bonus bid was not the most advantageous because the burdens of administering the bonus payments would outweigh the negligible advantage they would provide to the Commission.

VII.

Because the Court has concluded that the cancellation of the First Solicitation was improper, the Court need not address the Second Solicitation. The Court feels compelled to state that intervenor Ann Riley is an innocent party in this litigation, and that but for the manner in which the FERC conducted both solicitations, there would be no need for this suit.

For the reasons discussed above, the Court concludes that the FERC and Ann Riley's, respective, motions for summary judgment must be denied, and Ace-Federal's cross-motion for summary judgment should be granted in part and denied in part. This Court further concludes that this case should be remanded to the FERC to determine which contractor provided the most advantageous bid to the First Solicitation. An appropriate Order accompanies this Memorandum.

Date MAR 3 0 1990

JOHN GARRETT PENN
UNITED STATES DISTRICT JUDGE

INSPECTOR GENERAL REVIEW

Mr. Conte. Has DOE's Office of the Inspector General concluded its review of government expenses incurred by the immediate past chairman of FERC? If so, please summarize key findings. If not, please indicate when the review is expected to be completed.

Mr. Scherman. It would be inappropriate for the FERC to comment on this issue. Any information concerning this matter should be requested from the DOE's Office of the Inspector General.

WEDNESDAY, MARCH 21, 1990.

NUCLEAR REGULATORY COMMISSION

WITNESSES

KENNETH M. CARR, CHAIRMAN
KENNETH C. ROGERS, COMMISSIONER
JAMES R. CURTISS, COMMISSIONER
FORREST J. REMICK, COMMISSIONER

Mr. BEVILL. The committee will come to order.

Chairman Carr, we are pleased to have you and each of the commissioners. We are going to put your biographical sketch in the record, as is customary. You certainly have a very outstanding record.

Commissioner Remick, the same thing applies to you.

We are impressed with both the background and the training that you have, and we know you are both going to be doing a good job. We look forward to working with you.

Mr. REMICK. Thank you, sir.

Mr. BEVILL. As Commissioner Rogers and Commissioner Curtiss are already doing—and I understand one of the commissioners is ill.

Mr. CARR. Commissioner Roberts is ill with the flu, sir.

Mr. BEVILL. We are sorry he couldn't be here.

Chairman Carr, you can proceed as you wish.

Mr. CARR. Thank you very much, Mr. Chairman.

As I said, Commissioner Roberts unfortunately has the flu today and is not with us.

Mr. Chairman and members of the committee, the Commission is pleased to appear before you today to present the Nuclear Regulatory Commission's fiscal year 1991 budget request. Accompanying us are the NRC's Executive Director for Operations, the General Counsel, our principal office directors, and the Inspector General.

Mr. Chairman, we have a brief opening statement. With your permission, we request that our full statement and our Inspector General's written statement be included in the record.

Mr. BEVILL. Without objection, that will be included. Each of your prepared statements will be included in the record, and each of you may just summarize.

Mr. CARR. As you know, nuclear power is an important component in our nation's energy supply. In 1989 nuclear power safely supplied approximately 20 percent of the nation's electricity, second only to coal.

Some significant changes have occurred in the last few years. These include an overall improvement in safety and performance, as well as initiatives to streamline the licensing process.

There remain, however, several high-priority issues that require resolution. One of these is the development of the proper regulatory base to prepare for plant life extension and the resulting reactor license renewal. A period of intense effort is needed to ensure that relevant safety questions are resolved before the current operating licenses begin to expire later in this decade.

The research effort evaluating the impact of plant aging on component and system safety performance is closely tied to the plant life extension issue. The groundwork must be laid now if we are to make intelligent decisions as to whether the nation's existing plants may remain in service.

Certification of standardized nuclear power plant designs is another very important issue facing us. We are giving priority to actions needed to anticipate and resolve safety issues for certification of designs for the next generation of reactors. This is essential if future U.S. nuclear power plants are to be built and licensed to operate in a reasonable period of time.

The NRC is currently involved in a phased review of the Electric Power Research Institute's advanced light water reactor requirements document and in two design certification reviews. We also expect additional design certification applications will be received during the next year or two.

NRC anticipates certifying one or more of these advanced designs in the near future.

Additionally, since a serious accident anywhere can have widespread consequences, another important issue is that of ensuring greater nuclear power plant safety worldwide.

In recent years the NRC has expanded its program for international cooperation in nuclear power safety. Our cooperative efforts in sharing safety and operational experience will serve to make commercial nuclear power safer everywhere.

Our fiscal year 1991 budget request is $475 million, an increase of $23.4 million above fiscal year 1990. Of the requested increase, $12,600,000 is urgently needed to achieve further safety improvements and to be responsive to the nation's future energy needs and industry initiatives. This portion of the increase will allow NRC to do the following:

First, to establish the criteria for renewing reactor licenses beyond their current 40-year term to ensure that operating license renewal applications can be reviewed on a schedule compatible with industry submittals. The first application is expected in 1991, Yankee Rowe.

Second, to establish licensing criteria and be prepared to respond to both the industry's and the Department of Energy's schedule for submitting advanced standard reactor designs for approval.

Third, to reduce the volume and complexity of the technical specifications under which all reactors are required to operate.

Fourth, to resolve in a timely manner the technical issues to support regulatory decisions on reactor safety systems and containments for operating plants, as well as those for advanced reactor designs to further enhance the protection of the public in the event of a severe accident.

Fifth, to conduct additional inspections of material licensees, improve the accounting of approximately 200,000 generally-licensed nuclear materials devices, begin the review of approximately 18,000 materials and fuel cycle facility licenses terminated since 1965 to ensure that these sites were adequately decontaminated, and initiate financial reviews for non-reactor licensees to ensure compliance with the new decommissioning requirements.

Sixth, to develop the regulatory framework for and review a first-of-a-kind application to construct and operate the nation's first privately owned uranium enrichment facility.

Last, to provide full regulatory support for the implementation of the Low-level Radioactive Waste Policy Amendments Act. This includes expanded research to assess alternatives to shallow land burial for low level waste and additional assistance to agreement states as they proceed with developing and implementing plans to construct low level waste disposal facilities.

An additional $10 million is also required for nondiscretionary expenses. The NRC is faced with higher payroll expenses resulting primarily from pay raises and additional agency contributions to the Federal Employees Retirement System, increased transportation costs for our inspectors to travel to licensee sites, phased replacement of outdated office systems and equipment, and costs related to the consolidation of our headquarters employees in Rockville, Maryland.

We have now consolidated more than half of our headquarters employees at one location, and we are continuing to actively pursue with the General Services Administration the completion of this consolidation. From what we have seen thus far, we believe that the benefits the agency will derive from complete headquarters consolidation will enhance our ability to protect the public health and safety.

We are also requesting an additional $800,000 for the Office of the Inspector General.

The details of our budget request are contained in our submission, which has already been provided to the Committee. The Appendix to our full statement summarizes the agency's budget request for each of its programs.

The President's fiscal year 1991 budget proposes to continue to fund NRC activities associated with the Nuclear Waste Policy Act through direct appropriation from the Nuclear Waste Fund. The President's budget also proposes to recover 100 percent of NRC's remaining budget through user fees charged to the industry.

In closing, we believe that our fiscal year 1991 budget is a responsible request for the resources needed to provide credible safety regulation of commercial nuclear power, civilian use of nuclear materials, and management and disposal of nuclear waste.

The modest funding increases we have asked for are absolutely necessary if the NRC is to continue to provide effective regulation and safety oversight of existing activities and to meet future initiatives that are already on the horizon. The Congress' continued support for the NRC's programs and resources is essential to the success of the regulatory program.

We urge you to appropriate the full amount of our request. We are ready to answer any questions you and the committee might have.

Thank you, Mr. Chairman.

Mr. **Bevill**. Do any of the other commissioners care to make a statement?

Mr. **Remick**. No.

Mr. **Bevill**. All right.

[**Clerk's note**.—The prepared statements and biographical sketches appear at the end of the hearing volume starting on page 1383.]

STANDARD REACTOR DESIGNS

The committee is encouraged by the Commission's new standardization and licensing reform rule. Please explain your efforts to certify a standard design reactor.

Mr. **Carr**. Well, we are currently looking at a design from General Electric, the Advanced Boiling Water reactor and Combustion Engineering's design, System 80 Plus, in addition to reviewing the Electric Power Research Institute's design requirements document. Those are the three priority items that we have on our plate right now.

Originally the EPRI design requirements document was intended to lead the designs of the various companies. It was intended that the utilities would tell the vendors what kind of plant they wanted and then the vendors would respond to that request and you would have a general design requirements document that the vendors would respond to.

The EPRI requirements document was overtaken by the vendors who did their own designs, and so we are trying to look at their designs at the same time we are trying to look at the requirements document from EPRI.

Those are our three priority efforts, so we would expect that the GE and the CE designs will probably be the first ones that are certified, and the GE design we would expect to come along first. We are looking at the dates now of what will be the most likely time that we can certify those designs, and that is currently under the staff's and the Commission's review. We don't have a firm date, but we would expect those two to come before the mid-1990s certainly.

Mr. **Bevill**. The committee is very concerned about possible delays in the NRC effort to certify standard designs. How many FTEs has the Commission budgeted for the certification review? And what is the optimum number of FTEs for the Commission to expedite this process?

Mr. **Carr**. Let me get the staff to give you the answer to that question, sir, because they are still working on that problem and haven't sent it up to the Commission yet.

Mr. **Bevill**. All right.

Mr. **Taylor**. I am James Taylor, the Executive Director for Operations.

In fiscal year 1991 for the evolutionary and advanced reactor reviews, we will go to 35 direct FTEs and about $3 million. In fiscal year 1990 we have been at 24 direct FTEs and $1.6 million. We are proposing an increase in this next budget to dedicate additional staff and contractor support for the evolutionary and advanced reactor reviews.

Mr. **Bevill**. Is that enough?

Mr. **Taylor**. We believe that will be enough to keep up with the progress. The delays that the chairman has mentioned are part of the staff settling with the Commission the review process. So we have early Commission involvement in important safety decisions which the Commission will ultimately have to rule on when the plants are certified by rule. So it is that process that we are currently settling with the Commission. In fact, we have met with the Commission and are currently preparing a final paper which will address approaches to minimize any delays in the certification process.

Mr. CARR. The Commission has asked the staff to get to us on the major decision points on issues that are policy for the advanced reactors, and we have not yet decided with the staff on what the optimum schedule is. But it is our opinion, sir, that the NRC won't be on the controlling path in the construction of any new reactor plant. We will have a certified design by the time somebody orders a plant.

Mr. BEVILL. That is encouraging to hear, because it has certainly been a problem in past years. As a matter of fact, we don't have a new order.

Mr. CARR. No, sir. We don't have a new order and we have no indication of orders.

Mr. BEVILL. Frankly, we know first-hand that the NRC has played a big role in making that situation exist, and so we would like to see this changed. I think you all are getting on the right track to do it.

In looking at standardization. Are you looking at France and these other countries that have their nuclear plants standardized? Or do you think we are so much better that we don't need to waste any time on it?

Mr. CARR. No, sir. It is fair to say we looked at everybody. Of course, everybody followed us and learned from our mistakes. They also have a little bit different setup in their governmental organizations that control not only the designs but also the production. They are able to control what plants are built somewhat better than we can in this country.

But when the utilities start to build nuclear plants again I don't think the NRC will be on the controlling path that makes them delay construction as we have seen before.

It is our opinion that under the new part 52 rules if an applicant submits a certified design and has a pre-approved site that it will take us probably two to three years to do our work in the licensing role, plus however long it takes them to build the plant. We would estimate that it should be six years or under if they do their construction work right. Therefore, we are talking somewhere in the eight- to nine-year period, or less, from application to being on-line.

Mr. BEVILL. That would be an improvement, but we would like to see it sooner than that.

Mr. CARR. So would we, sir.

Mr. BEVILL. When you are talking about standardization, are you talking about one size, or are you thinking in terms of having different standardized sizes?

Mr. CARR. Our procedures allow anybody to get their design certified. Then it is going to be up to the utilities what design they decide to build. I would assume that we may have two or three kinds of PWRs certainly and one kind of BWR, and maybe in the advanced reactors we will have a gas-cooled or a liquid metal. I wouldn't expect to see custom-made plants any more. I would think that they will follow the certified design, so that will help as far as standardization. For instance, it is not going to be 30 plants just alike. We will certainly be down to five or six different kinds instead of maybe 110 different kinds.

NUCLEAR INDUSTRY

Mr. **Bevill**. Yes. During fiscal year 1990 how many new nuclear power reactors are expected to begin operation in the United States? How does this compare to the estimated number of new reactors worldwide? What role has the Nuclear Regulatory Commission played in the paralyzed condition of the nuclear industry?

Mr. **Carr**. I think worldwide there are some 530 or so plants either in operation or under construction. I think there are approximately 425 in operation and approximately another 100 under construction. The United States has about one-fourth of the world's operating plants, and we produce about 30 percent of the world's electricity that is generated by nuclear power.

As far as the number of plants expected to come on-line this year, we have licensed one for full power this month. We would expect Comanche Peak to come up for full power license next month. I don't believe there will be any other new construction plants this year. Watts Bar would be the next two plants in line, and I don't believe they will be ready this year. It will be 1991 or 1992 at the earliest before they come on.

Mr. **Bevill**. The Chair recognizes Mr. Myers.

Mr. **Myers**. Thank you, Mr. Chairman and Chairman Carr and members of the Commission.

First I commend you for the courage that you have shown during the past year in at least getting Seabrook operating or on-line. I know it hasn't been an easy decision for you, but at least it is a positive one—the first one really I think this Committee has seen for the last 12 years. At least as one member of this Committee, I have been quite critical of the Nuclear Regulatory Commission the past few years. I thought they demonstrated the lack of courage and the lack of mission that the Commission should have had. By all the lack of activity, they demonstrated that they felt their responsibility was to prevent construction of nuclear power instead of trying to provide it in a safe way. They just demonstrated that they were very negative in every respect. But you are showing positive things. I think that is your responsibility to the American people.

As you said, we are producing one-third of the world's nuclear power today as far as the generation of power. I should know this, but what is the total electricity that the United States generates? What percentage of the world's electric generation?

Mr. **Carr**. About 30 percent by nuclear. I don't know about the total electrical generation.

Mr. **Myers**. I know 30 percent. You said that. But what about the total generation of the world? Do you know that?

Mr. **Carr**. I don't have that.

Mr. **Myers**. I should know that, but I don't.

Mr. **Carr**. We'll provide it for the record.

[The information follows:]

U.S. GENERATION OF ELECTRICITY

Based on data in the *International Energy Annual—1988*, published by the U.S. Department of Energy, in both 1987 and 1988 the U.S. accounted for about 26% of the total world generation of electricity.

Mr. CARR. I would guess it to be around 50 percent, but that is just a guess.

Mr. MYERS. I thought it was higher than 30.

Mr. CARR. We are one of the big users of electrical power, of course.

LICENSING REFORM

Mr. MYERS. And that is the reason we have the standard of living we have today and being able to be competitive with the rest of the world. In the world I have travelled in, I think our power is still cheaper than most other countries of the world. But that could be debated, I guess, by a lot of environmentalists. I mean that seriously. I will not revise my remarks on that point.

Did we learn anything from the legal experience at Seabrook? Is nuclear generation any safer today environmentally or for the workers, than it would have been if we had put Seabrook on the line several years ago when it was due to go on line?

Mr. CARR. What I think we have learned is reflected in our revision to the procedures that we put out with part 52 to try to get one-step licensing. I think that we have learned certainly that we ought to be able to take care of all the controversy up front before the investment is made, and I think that is the major lesson to be learned. We certainly want to keep the public involved in siting and building and getting permission to build nuclear power plants. That is their right. We don't want to eliminate that.

On the other hand, we think that the procedure can be shortened so that it becomes not a long, drawn-out affair for a utility to get permission to site and build a plant. We think that we have taken care of that now. Yes, I would say we have learned something.

Mr. MYERS. Have we heard from any utility companies—Many are in need of additional electrical generation capacity today—because of your licensing now of Seabrook? Are they likely to make a bid to build a nuclear reactor?

Mr. CARR. I have not heard, nor have I heard of anybody who has been approached. I said when I came on the Commission that I figured somebody would at least apply for a site permit before my term was up. I still believe that may be the case. The only encouraging sign I heard was in January of this year when I was at a meeting in Florida and one of the Florida public utility commissioners, who is just recovering from the rolling blackouts over Christmas Eve and Christmas Day——

Mr. MYERS. Fifteen years ago a blackout or a brownout, except with some rare occasions, was just really not necessary. We just didn't hear about it back then. Once in a while there would be an occasion where you would have some generation go down for some technical reason or mechanical reason, but it just really wasn't a shortage of power, per se.

But now we are being told that this summer, especially if we have a very hot summer, we are going to have a series of brownouts if not blackouts. As you say, in many areas of the country during last December—and Christmas-time, particularly—they had brownouts and blackouts, which I experienced myself.

I think the Nuclear Regulatory Commission has some responsibility to help avoiding this in the future. You mention that you recognize your responsibility and the part you may play in avoiding these in the future. If we are to continue to be the industrial might of the world—and I wonder if we can continue—one of the things that is absolutely essential is available electric energy at a price that is competitive.

Mr. CARR. There is no doubt the utilities have reduced their margin because they are not building any new baseload plants anywhere in the country. I think we do have a responsibility to not be a detriment to anyone who wants to build.

Of course, our primary function is to ensure that whatever is out there is run safely and built safely, and we will continue to do that. But we don't want to, at the same time, end up being an obstacle in the path of people who are trying to provide that power.

STANDARD REACTOR DESIGNS

Mr. MYERS. This committee has never suggested that the Nuclear Regulatory Commission should cut corners, but it ought to be positive to at least tell the utility companies how they could build a safe reactor. One of the things you have discussed with the chairman, is the standardization of the nuclear reactor.

Now, quite frankly, in your discussion with the chairman you say GE is going to have one approved. How is that different from what we have had in the past? GE was getting them approved in the past?

Mr. CARR. Well, I tend to agree with you, sir.

Mr. MYERS. How is that any different. Pardon me for interrupting you, but we have been led to believe for the last ten years that the Nuclear Regulatory Commission was working on a design that anybody could build, not just GE. Now you say that the vendors who are building reactors are coming on-line with their recommendation. I don't see much change in that from what we had before.

Mr. CARR. I share that opinion. My personal view of standardization is to have one design that any constructor can build. I have briefly discussed this with Mr. Young at the Department of Energy to see if there is a possibility that the Department of Energy could compete the designs and then we could settle on one BWR design and one PWR design. That is real standardization, in my view.

After you compete the designs, then you can let anybody construct them. But then, in that case, the Department of Energy would probably own the design.

Mr. MYERS. So?

Mr. CARR. I agree with that.

Mr. MYERS. We own a lot of things.

Mr. CARR. That is standardization, but we haven't gotten that far yet. That is a personal opinion I haven't discussed with the other commissioners, so it is not a general view.

COMMISSION INTERACTIONS

Mr. **Myers**. You don't dare discuss it today because one is missing.

Mr. **Carr**. You can discuss it. We can discuss it today. We are a very collegial body. We will——

Mr. **Myers**. We have heard that for years. I am surprised that you are even able to be here today with one missing. [Laughter.]

Thank you for being here though with one missing. Did you have to get a letter from him to say it is okay for the rest of you to meet or something like that?

Mr. **Carr**. We now collegially meet with no subject matter at random times. We have one coming up——

Mr. **Myers**. We do that in Congress all the time. [Laughter.]

Mr. **Carr**. We have one coming up in April. If you would like to come out and just sit down and watch us shoot the breeze, we are there.

Mr. **Myers**. If I am going to shoot the breeze, I can think of an atmosphere I'd rather be in. Out in Indiana we don't call it shoot the breeze though. [Laughter.]

SITE SELECTION

Well, I have one or two more questions.

Now, the type of reactor we build is one thing, but one of the problems we have had in the past is site selection. What are we doing on standardization for this so that an industry who wants to build a reactor some place can say, "Well, this is certain criteria that we must meet."? Are we doing anything on site selection—previous approval of the site?

Mr. **Carr**. We are ready for an application for a site selection to come in. The Department of Energy has expressed an interest in doing a trial site selection to see if the procedures are working all right, so we are following what they want to do. If they apply for a site, we will be happy to go through the procedures for licensing. But we believe that currently we have got the procedures in place to take care of the past problems, and hopefully they won't come up again.

NUCLEAR INDUSTRY

Mr. **Myers**. I hope when we meet again next year—and I hope we don't have to meet between now and next year—that there will be some industries, some utilities that will come forth and say they are interested in building a nuclear plant and you will have some applications that you have dealt with already.

But you mentioned that nuclear energy is now producing 30 percent of the electrical generation of the United States. But other countries—Japan, as an example, and France—are expanding more rapidly than we are, aren't they?

Mr. **Carr**. I may have left you with a misimpression. In the United States 20 percent of our electricity is generated by nuclear power.

Mr. **Myers**. You are right.

Mr. **Carr**. In the world, 30 percent of the electricity generated by nuclear power is by U.S. nuclear plants.

Mr. **Myers**. That was my error.

Mr. **Carr**. The Japanese are around 30 percent in Japan now, and they plan to be at 50 percent in the year 2000. The Soviets are building, the British are building, the French have just about finished their program.

But I would say nuclear power around the world is in pretty healthy shape except for in the United States where we are not building anything.

Mr. **Myers**. It has always been strange to me that Japan, who had the most tragic experience with nuclear energy, is the one that is growing the most rapidly. We developed nuclear energy knew how to handle it and we are the ones sitting in the back 40 watching everybody else build.

Mr. **Carr**. Well, there is a little bit of a discrepancy if you look at Japan's numbers and our numbers. We talk about how fast Japan can build a plant, and that's true from the time they start construction until they finish it. But when we talk about the U.S., it is from the time the application is filed until the plant is built, Japan's problem comes in getting permission for a site. It sometimes takes them as long as 17 years to get a permit to build on a site. My understanding is that currently they have no approved sites in Japan on which to build. So they have problems, too. They happen to be different than ours.

Other spots in the world these days are beginning to see some of the problems we have seen in the U.S. with public opinion.

Mr. **Myers**. Of course, in Japan, they are having trouble building anything right now because of the difficulty in finding a sight. They are crowded.

Mr. **Carr**. Yes, sir.

Mr. **Myers**. That is the reason Japan started World War II. That is the bottom line.

Mr. **Carr**. Well, their intent, of course, is to become energy independent and not need that much oil any more; both France and Japan have that impetus—that is not in our country.

Mr. **Myers**. I hope all members keep that positive attitude. We simply have got to move forward. I don't know what we are going to do for our children and grandchildren. We can't build a dam any more. That is environmentally unsound and unsafe. We can't burn coal any more because of acid rain and all of the other associated problems with burning coal. So how in the world are we going to produce the energy for the future if we don't move to nuclear? I think you have a tremendous responsibility on your shoulders, and I do congratulate you and thank you for the job you have done so far. Keep up the good work, but build them safe, of course. I think that is your primary responsibility—to build safe power.

Mr. **Carr**. Yes, sir.

Mr. **Myers**. Thank you.

I have some other questions I will provide for the record, but thank you for your testimony.

REACTOR LICENSE EXTENSION

Mr. **Rogers**. Mr. Myers, if I might point out that one of the other very high priority items in our agenda is a plant license renewal program. While building new plants is certainly an important one for the future, we don't have any immediate prospects of a particular utility that is ready to go. However, we have many utilities that have nuclear plants that are going to come up to the end of their licensing period in the foreseeable future, and it is very important that we be in a strong position to make decisions on plant license renewal when they come up. We see two of them on the horizon right now in front of us.

Mr. MYERS. How long is a utility issued a license to operate?

Mr. ROGERS. For 40 years.

Mr. MYERS. Forty years?

Mr. ROGERS. Yes.

Mr. MYERS. And have the regulations changed where they are going to have to retrofit at a tremendous expense some of these plants that will be requiring relicensing?

Mr. ROGERS. We are working on the whole question of what is required for license renewal right now. Part of the activities of the Commission that we are asking for funding for involve cleaning up any research aspects that have to be taken care of to be absolutely sure that we know exactly what the plant aging problems are that have to be dealt with in making decisions on plant license renewal. So that is an important part of our priority for the future.

Mr. MYERS. Along that line, Mr. Chairman, I started to relinquish my time but I will use another couple of minutes.

Mr. BEVILL. Go right ahead.

REACTOR OPERATOR LICENSING

Mr. MYERS. Last year Chairman Zech mentioned the fact that the Commission was working on a process for licensing the operators—standardization of that process. What has happened to that?

Mr. CARR. Operator licensing—I don't think we changed the process for actually licensing the operator. What we changed was the requalification for the operators. We have changed significantly the requalification exams that we do for licensed operators and we think we have reasonably good exams now and the process is proceeding. Instead of giving the lawyer his bar exam all over again, if you will, we have tried to make sure——

Mr. MYERS. Thank gosh they don't do that. Maybe they should do that. Maybe that would help.

Mr. CARR. We tried to make sure that the examination is operationally oriented, that they are keeping up with the changes in their own plant and the changes in the rules of the game. We are giving a much more practical exam on the simulator that takes in the kinds of things that they need to know on an everyday basis to take care of potential problems in the plant. So we think that we have taken some steps forward in the requalification program for the operators to continue to ensure that they stay qualified while they are operating the plant.

Mr. MYERS. What term is a license issued to an operator?

Mr. CARR. He is not licensed for a fixed term, but our rules say that we will re-examine him at least once every six years to make sure that he is still qualified.

Mr. MYERS. Is there a test?

Mr. **Carr**. Yes. A very intensive written——

Mr. **Myers**. Oh, there is a written test?

Mr. **Carr**. A written exam, a walk through the plant, and a practical exam on the plant simulator to make sure that the team can handle the casualties. If you listen to the operators, it is a very intense exam, and one of the problems they are saying they have with it is that it is too stressful for the operator. So I don't think it would be considered by anybody to be——

Mr. **Myers**. We have an exam like that every two years that is very stressing, too. [Laughter.]

Mr. **Carr**. Our grading group is not quite as big as yours, but [laughter].

Mr. **Myers**. We just hope ours is big enough.

Thank you.

I have some other questions I will provide for the record.

COMMISSION INTERACTIONS

Mr. **Remick**. Mr. Myers, I wonder if I could respond to one of your comments.

Mr. **Myers**. Sure.

Mr. **Remick**. It is probably the only time in my tenure as a commissioner that I can make such a statement, but I have observed or participated in various Commission activities through the years—as a licensee, as a licensee's representative, as a consultant, as Director of the Office of Policy Evaluation, and as an advisor. So I have observed many Commissions in the past. I can honestly say that this Commission is a good Commission, and I feel that I have been very well received. The Commission works together out of mutual respect for one another. I have observed no back-biting. I think it is a very cooperative effort to do the best possible job. I say that not because I am on the Commission. I would have said it several months ago based on my observation. I honestly and sincerely feel that. I think you have a good Commission.

Mr. **Myers**. Thank you.

Mr. **Remick**. It is the only time in my tenure I can say that.

Mr. **Myers**. Well, we have noticed that, too. I say "we" often. I have to speak for myself. I can't speak for my colleagues. But we have noticed back-biting and the lack of positive attitude on behalf of the Commission, and we notice a change here. I compliment you. I opened my remarks by complimenting you for that because I think you do have a responsibility that other commissions have not recognized. You have a responsibility for providing electric energy safely. I think your primary responsibility is safety.

Mr. **Carr**. That is correct.

Mr. **Myers**. But another responsibility is to produce the power. I think it often has not been that way in the past. So I do compliment you. Again, this committee has never asked the Commission to ever cut any corners but to be positive and move forward. We compliment you.

REACTOR OPERATOR LICENSING

Mr. **Carr.** I am informed that I need to correct one thing. The license does expire in six years if we don't renew it for the operators. I indicated it didn't.

Mr. **Remick.** Yes. It used to be two years and was changed to six years several years ago.

Mr. **Myers.** The Senate has a six-year license, too. [Laughter.]

Mr. **Bevill.** The Chair recognizes Mrs. Boggs.

Mrs. **Boggs.** Thank you, Mr. Chairman.

Mr. Chairman of the Commission and commissioners, it is very nice to see you and to have you here. Thank you very, very much.

WATERFORD, GRAND GULF AND RIVER BEND REACTORS

There are three nuclear power plants which provide electric power generating capacity for Louisiana electric consumers. These are Waterford, Grand Gulf and River Bend.

Please characterize the operating experience at each of the facilities in the past year. How does this record compare with other industry experiences?

Mr. **Carr.** Well, I think that the plants at those three sites are operating safely. Of the three, I think that our view would be that Waterford is probably the better of the three plants. Certainly all of them are average or above average compared with the rest of the plants in the country. Two of them today are at 100 percent power, and the other one is down for a maintenance outage. River Bend is down for a maintenance outage and should start up later this month, but it has been a reliable operating plant.

Mrs. **Boggs.** I want to ensure that the Commission is still monitoring the principal safety issues raised during the licensing of Waterford. Are you continuing to monitor the base mat at that facility?

Mr. **Carr.** Yes, ma'am, we are.

Mrs. **Boggs.** Is there anything that should raise safety concerns about its integrity?

Mr. **Carr.** No, ma'am. In none of these three plant sites should you have any concern about their safety.

URANIUM ENRICHMENT

Mrs. **Boggs.** There is a proposal to construct a nongovernmental uranium enrichment facility in Louisiana. What role will the Commission have in the licensing of this facility? And what issues will the Commission examine?

Mr. **Carr.** Well, we have the responsibility to license the plant for operation. We have not had a private enrichment plant in the country before. There is some discussion under what section of our regulations we would license it. Currently we would license it under part 50 of the regulations. There has been a proposal that we license it under two other parts of our regulations. If we were to do that, it might simplify the license review a little bit. But, in either case, we would go through the same procedures at the NRC involving the public participation. The public would certainly have a right to get involved in the licensing process. But the soonest we would expect that application for a license is late next year. We are prepared to handle that.

If you need more details, I can ask Mr. Bernero, who has visited one of those plants overseas with some of the staff, and also Commissioner Rogers has visited one of those plants overseas. If you would like to hear their comments——

Mrs. BOGGS. I would like to very much.

Mr. CARR. Commissioner Rogers?

Mr. ROGERS. Yes. Last May I visited with one of my staff members the Urenco facility in Capenhurst, England. Urenco Ltd., as you probably know, is a group of companies that are from the United Kingdom, from the Netherlands, and from the Federal Republic of Germany. They have together formed Urenco, Inc., which is a U.S. wholly-owned subsidiary of Urenco Ltd., to build and operate a separation enrichment plant in the United States in Louisiana.

When that plant is operating, if it does operate at full capacity, it would supply about 15 percent of the U.S. commercial enrichment demand.

As the chairman has said, they expect to submit a license to the NRC in late 1990 for a construction and operating license.

The visit was a very interesting one. We viewed the site on which a good deal of development of these ultracentrifuges had taken place, starting in the 1960s. A pilot plant was placed in operation there in 1973, and a commercial-scale plant in 1977.

At Capenhurst there are two plants in operation right now, one with a second generation of design and another with a third generation of design. They demonstrated to us the next generation, the fourth generation, of ultracentrifuges, and that is a design that would be built in the United States.

They are expected to be introduced at Capenhurst this year. They use a sophisticated system which is very proprietary. We couldn't see exactly what the design was but we could see what these things looked like and how they operated from the outside. They use frictionless magnetic bearings and require very little energy to drive them. They operate for a long time without any problems whatsoever—the past ten years without any major maintenance, and they are looking for each unit to operate anywhere from 12.5 to 15 years without any maintenance.

It is an interesting concept, a very large collection. There are thousands of these in arrays that, once they are turned on, are never turned off and are never maintained. When one of them fails it just fails and is left in the system and nothing is ever changed. So the whole system operates until it is ready to be shut down having reached the end of its lifetime, which could be many years. It is very reliable, very quiet.

They think that they have got the right formula for constructing and operating these things: never tinker with an existing plant that operates satisfactorily by introducing equipment upgrades and innovations, rather save them, instead, for the next generation of plant. That is the principal they want to use in constructing the plant in the United States.

They have to be placed in a seismically quiet environment for good operation, and that was very important in selecting the site in the United States.

So we visited the facility. It is very clean—spotlessly clean, quiet. We happened to be there when the rare event of one of these failures actually did take place, and it sounds just like a little tic and that is it. Nothing else happened.

An interesting aspect of these machines is that because they are so delicate and precise in their construction, a good deal of the fabrication of them has to take place on the site. I understand that in the United States they expect to bring parts in and assemble them with perhaps some fabrication on the site, but it is very important that they be assembled on the site and put in place very close by rather than trucked in from a factory someplace else. So the assembly facility is a big part of the site when it is first set up. Then, of course, once they are all built and installed and go into operation there aren't very many people required to run the plant after that.

There are some issues that we would have to look at. I might just say that the gas flowing through those during the separation process is very low density. We were told that any chemical hazard resulting from the chemical reaction of any release of the uranium hexafluoride gas with moisture in the air would not produce hydrogen fluoride gas that would not spread very far. According to Urenco, at 50 yards beyond the facility boundary the products from any such chemical reactions would have been diluted to well below any regulatory levels of toxicity.

The facility there was monitored by both Euraton and the IAEA safeguards. All the production areas are monitored by TV cameras and inspectors from both of those organizations visit the facility periodically. I would expect that would be something like what would be required here in the United States.

There are a couple of issues that we would want to make sure we looked at to see whether the—no maintenance—run to failure—design of the centrifuges has any safety issues that would be of concern to us. Urenco did not feel so, but we would have to review that matter ourselves.

And then, of course, we would have to look at the seismic sensitivity of the facility.

Mrs. Boggs. Thank you very much.

Mr. Carr. Mr. Bernero, do you have anything you want to add to that?

Mrs. Boggs. Were you at the site also?

Mr. Bernero. I am Robert Bernero, Director of Nuclear Materials Safety and Safeguards.

I did not visit that site in Europe, though I visited two other sites they have on the continent in West Germany and Holland. My observations were very similar to the Commissioners. As he said, the principal safety issues would be the chemical, toxic, and uranium content of uranium hexafluoride, but principally in the large storage containers.

And, of course, the safeguards issue will be present because this is a production facility for making special nuclear materials.

Mrs. Boggs. Thank you.

Does the Commission have any recommendations about the proposed changes in the licensing process that you referred to? What changes do you think would be appropriate?

Mr. CARR. Well, we would go through about the same procedures under either parts 40 and 70 of our regulations or the current part 50, but we have said that we think it would be a little simpler to license it under parts 40 and 70 rather than part 50. However we are prepared to go in either direction. As far as we are concerned, it will have to go through about the same process either way.

Mrs. BOGGS. Thank you very much. And I thank you so much, Mr. Rogers, for such a wonderful explanation. As you can imagine, there is a lot of interest and there is some apprehension that has been expressed about having the enrichment plant there.

EQUAL EMPLOYMENT OPPORTUNITIES

I would like very much if you would bring the subcommittee up to date on the Commission's efforts to hire and promote qualified women and minorities within your work force. Especially, what is the current level of distribution of women and minorities in senior positions at the Commission? I must say that it is nice, indeed, to see you, Ms. Norry, on the front row.

What about women and minorities in the mid-level grade?

Mr. CARR. Well, we are not doing as well as we would like to do, but we do have an aggressive program and we are doing—if you have some good candidates, send them over. We would like to hire them.

In fiscal year 1989 women represented about 33 percent and minority persons about 18 percent of the total work force. Those percentages were the same as they were in 1988, even though we reduced the total employees by 43 people. So that was a small gain.

In grades GG–11 and above, including SES, we went from 379 in 1988 to 392, so we gained about a percentage point there.

Minorities in grades GG-11 and up, including SES, went from 282 to 292, so we gained another percent.

One minority male and one woman were selected for SES positions in fiscal year 1989.

So we are making slight progress. In my opinion we can do better, and we are trying to do better.

Mrs. BOGGS. Could you tell me perhaps some of the goals that you have as the new chairman for improving the situation?

Mr. CARR. I couldn't mention numerical goals. I don't remember what they are. But I think that there is no doubt in the Commission's mind of my support for upward mobility both for minorities and for females in the organization. We have all kinds of programs for self-help development, and we are trying to move them up as rapidly as we can.

Mrs. BOGGS. Thank you, Mr. Chairman. Do any of the other commissioners wish to comment?

Mr. REMICK. Let me just say that during the process of interviewing for my own personal staff I was impressed not only by the quality of all the individuals I interviewed, but particularly some of the women engineers that I met and interviewed in that process. I was very proud of them, and have suggested to my home institution, Penn State, that they should have some of those women come and talk to engineers at that institution. I was very favorably impressed with the quality of the individuals.

Mrs. **Boggs**. Thank you.

Mr. **Rogers**. I just might add that I strongly support this kind of an effort. I have, for many years, as an educator—and an educator of women engineers—been very concerned that they have every opportunity that the male engineers have had.

I must point out that in my own office I have three technical assistants and two of them are women.

Mrs. **Boggs**. Thank you.

Mr. Curtiss?

Mr. **Curtiss**. Yes. I think the support within the Commission is virtually unanimous on the need to cultivate upward mobility. It is important for us to be able to develop from the ground up with the feeder programs—get the qualified people, both women and minorities, into the system. I think you will see that that commitment exists across the top of the agency and hopefully throughout.

Mrs. **Boggs**. I thank all of you very much. You see, John, that is a collegial decision that they reached in good accord. [Laughter.]

Mr. **Myers**. You had to pump them though. [Laughter.]

Mrs. **Boggs**. Thank you, Mr. Chairman. And thank all of you.

Mr. **Bevill**. I have to remind Mrs. Boggs every once in a while that she is doing such a good job on getting women employed that in the year 2000 I'll be asking if you will tell us how many men you have on your payroll.

LICENSING REFORM

Last year the Commission approved a new rule on standardization and license reform that promises significant improvements in the nuclear licensing process. Is consideration now being given to establishing hold points during plant construction to implement the inspections, the tests, and the analyses necessary to assure plant conformance with a combined license?

Mr. **Carr**. Yes, sir. Inspection tests and analyses are the key to making that system work. Currently the NUMARC organization and the staff are working together on setting up a model, if you will, of what should be in that system. It is, as I read the rule, the responsibility of the licensees to put those inspections, tests and analyses with appropriate hold points in a request for a combined license, and then we will have to approve those to make sure that we have got the right things for the inspections' tests and analyses in there so that when we get through with the construction process we can have confidence when we say the plant was constructed in accordance with what they promised they would do. This approach will enhance the certainty for license applicants that if they build it like they said they would, then they will obtain permission to operate. But that is a key part of the rule.

Mr. **Bevill**. Well I hope that you will keep in mind that every time you stop the construction you are opening it up and making yourself vulnerable to people who are opposed to nuclear power and they are going to create some more problems for you. I want to throw that out for your thought.

Mr. CARR. It is not clear yet that we have to stop construction at those points.

Mr. BEVILL. You think you may be able to do that without stopping?

Mr. CARR. Maybe it can be accomplished. Not all construction would have to stop for a particular hold point. We are still working out just what kinds of things we have to do there.

Mr. BEVILL. I just wanted to throw that out for you to consider because if you can avoid stopping, I think that would probably solve the problem, because we have so many people that are still anti-nuclear plant. As a matter of fact, I guess we would all be glad to see the day that we don't need nuclear plants, but we are not going to see that any time soon. And after the Clean Air Bill passes it is going to be a long time before we reach that point.

So what this panel is anxious to see is a reasonable time taken to get a nuclear plant built safely.

Mr. CARR. Yes, sir.

Mr. BEVILL. As Mr. Myers said, we never want to see any cutting of corners, but when it seems that it takes ten to fourteen years to build a plant, and of course, that is unreasonable. No company that I know of can afford that. And so I am glad that you all are giving some serious thought to standardization. I think that is the answer. And the one-stop license that you have advocated is good. I feel better about our Commission now than I ever have, because I think you are at least on the right track now in trying to produce a safe source of supply.

Mr. CARR. Well, we would certainly like to see somebody try out the process because we believe it will work. We are waiting for the first application.

Mr. BEVILL. We have heard some nightmares with the testimony presented here. We had two Members that were opposed—they always voted no on everything—and two that were pretty positive and one that was doubtful, so one man ran the Commission. He made the decision because he knew how the others were going to vote before they even voted. It was that sort of thing. It was kind of like one of my county commissions. The probate judge was in the hospital. They passed a resolution saying, "Wishing you a speedy recovery," and all of that, which was nice. But they put a P.S. on it: "This resolution passed by a vote of three to two."

The Commission in the past has reminded me of that incident. It looks like we are really moving out now on the right track in getting something going so that nuclear power will have a future in this country. It is certainly going to be needed. As a matter of fact, it is not just needed but it is a necessity. We are going to have to have it.

Mr. CARR. We will certainly try to keep it safe, but not unnecessarily delay it.

Mr. BEVILL. Yes. Well, Mr. Myers was talking about you getting together. I had forgotten, but I know what he is talking about. The testimony here was that if one of the commissioners walked into a restaurant and saw another one he would have to leave. They weren't permitted to be in the same area. We got into some entanglements there.

John, that was one of the things you were thinking about.

Mr. MYERS. One of many things.

Mr. BEVILL. Many examples. And then they would stand there and watch them complete a plant, knowing that they were building it wrong, but they didn't have the authority to say anything so they would wait until they had finished it and then backfit, as we call it. We have had some horror stories here as far as getting something done.

But I think we are in the best shape we have been in now. So if we can get to where we can build a nuclear plant in less than ten years. Beyond ten years it seems to me would be almost an impossible financial drain unless, as you said, some other type of financial arrangements are made. Maybe that is a good approach.

Mr. CARR. The utilities tell us that ten years is their planning cycle and that is why we are really——

Mr. BEVILL. They are saying they can handle ten years?

Mr. CARR. No. They try to plan ahead on a ten-year cycle. The licenses start to expire ten years from now, and so the license renewal rule becomes very important because if they can't get that plant license renewed then they have to plan on what to build and how to replace that amount of electricity. So ten years for a planning cycle is reasonable. If we can get down to an eight- or nine-year construction period we are within that planning cycle. So, while we would like to see it done——

Mr. BEVILL. Of course, you all are determining how long it takes, you know.

Mr. CARR. Well, our piece of that——

Mr. BEVILL. Not the utilities.

Mr. CARR. Our piece of that action is about two to three years.

Mr. BEVILL. The license?

Mr. CARR. The licensing. Yes, sir. Under the new rule. And then from then on it would be up to the utility and his construction efficiency.

Mr. BEVILL. Have you reached that point yet on the licensing where you can do it?

Mr. CARR. We haven't had a chance to try it out, so that is where we think we are.

Mr. BEVILL. You think you could do that.

Mr. CARR. We fully expect we could do that in somewhere between two and three years, depending on how the——

Mr. BEVILL. And you think at this time that you can actually go in and check it and see if it is complying with the requirements and not stop the construction?

Mr. CARR. We don't know for sure if we are going to have to stop construction while they are in the process of building that plant to perform the inspection, tests and analyses, but that is a key part of the rule. We are going to have to get that in place.

Mr. MYERS. If you'll yield?

Mr. BEVILL. Mr. Myers?

Mr. MYERS. While we are on this subject, before we leave it, issuing a license to construct is one thing, but in that period after the construction starts and getting on line—Seabrook is an example—there can be a long way. There are other ways of stopping a plant.

I'll tell you one that was reported to me. At least I have heard the story. Indiana had tried twice to build a nuclear power plant—

both times unsuccessfully—two different utilities. But the one—a pipefitter told me this story a number of years ago before the plant was closed down. He told me that he put one elbow in a line every day for a month. Get in line, an inspector would come along and ask: "Has that been magnafluxed?"

"Yes, it had been magnafluxed yesterday."

He said, "Before it was put in the system?"

"Yes."

"Well, in the system it could have developed a crack."

He would take it out, have it magnafluxed, put it back in, and the next day the inspector would come along and say, "Has that been magnafluxed?"

"Yes. Here is the certificate."

"Yes, but it has been put in the line."

They couldn't magnaflux it in the line. They had to take it off. For a month all that guy did was put an elbow in and out of that system. Things like that are just absolutely harassment.

Mr. CARR. That doesn't sound like one of our inspectors because they really don't have that authority.

Mr. MYERS. How in the world do you know? You weren't even there then.

Mr. CARR. I know it.

Mr. MYERS. I wasn't either. I said it was hearsay. But a pipefitter who was getting paid for it——

Mr. CARR. That is the way it looked to him.

Mr. MYERS. He told me the story, but whether it is true or not I don't know, but this seemed almost impossible. But we know for some reason that plant was never built.

Mr. CARR. Yes, sir.

Mr. MYERS. Those are things. You can issue the license to permit to build. I'm sorry, Tom, to take your time, but—you can issue the permit to start construction, but if they can't successfully operate that, such as Seabrook, they go down the tube one way or the other.

Mr. CARR. The current procedure issues a combined license—construction and operation—up front so that they only have to get that one license. And then we ensure that they build it the way that they said they were going to build it, and then there is no more argument about their operating license. So they only have to get one license. They have to get it before they put a big investment into the plant. So we get all that controversy over with before the investment goes into the plant. That is the intent.

Mr. MYERS. We will be sitting up here watching. I hope it works.

Mr. CARR. I am waiting for the first test case. We will undoubtedly learn from the first one, but we think we have got it in place.

Mr. MYERS. That scares me, too. You are going to learn and then you are going to change the rules again after you learn.

Mr. CARR. We don't think we will have to change. But I understand that, and I have got some concerns until somebody tries it out. We think we have done the best we can do.

TVA REACTORS

Mr. **Bevill**. Can any of you give us the status of the TVA nuclear plants now?

Mr. **Carr**. Yes. It depends on what kind of detail you want to go into.

Mr. **Bevill**. Well, we want to know about when they are going to get back on the line. When are they going to produce electricity?

Mr. **Carr**. Sequoyah 1 and 2, as you know, are back on the line. Sequoyah 1 just shut down for refueling. Sequoyah 2 is at 100 percent this morning.

The next one to come along is Browns Ferry 2, and we expect that some time around September of this year it will be ready to go.

I think the intent from TVA, as I remember, is for Watts Bar 1 to come along behind that. Then, perhaps, two remaining Browns Ferry and then Watts Bar 2. But I'll get the staff to give you a little better run down.

Mr. **Murley**. My name is Tom Murley. I am the Director of Nuclear Reactor Regulation.

Chairman Carr summarized it adequately. In addition, as you know, the Bellefonte 1 and 2 plants are deferred in construction. The utility tells us that they plan in the late 1990s to perhaps complete those. But the summary that Chairman Carr gave is correct.

Mr. **Bevill**. When is the expected date of the Watts Bar? What year is that?

Mr. **Murley**. My information on Watts Bar is that 1991 would be the first unit ready for operation. I don't have a month for that.

Mr. **Bevill**. You might want to put in the record more detail on the status of those plants because that is a good example of some of the disasters we have faced on our nuclear plants.

Mr. **Carr**. We can do that.

Mr. **Bevill**. And any problems that we might have with any one of them.

Mr. **Carr**. All right, sir. We will provide that.

Mr. **Bevill**. We would like to know where we are on those.

Mr. **Carr**. Okay. We will give you a complete run-down.

[The information to be supplied follows:]

Tennessee Valley Authority Nuclear Plants

BELLEFONTE

On July 29, 1988, the Tennessee Valley Authority (TVA) (applicant) informed the NRC that on June 29, 1988, the TVA decided to defer construction on Bellefonte Units 1 and 2. This action was a result of a lower than expected load forecast for the near future and cost cutting efforts to improve TVA's financial position. The power from Bellefonte units will not be needed until the year 2000. The construction permit for Unit 1 expires on July 1, 1998 and for Unit 2 on July 1, 1999. TVA is expected to request the construction permit extension at the appropriate time.

BROWNS FERRY

The Browns Ferry Nuclear Plant Units 1 and 3 were voluntarily shut down by the TVA in March 1985 because of questions about the primary containment isolation leak rate testing for Unit 1 and reactor water level instrumentation for Unit 3. Unit 2 was in a refueling outage at the time. Additional questions and concerns were subsequently raised about the overall adequacy of TVA's nuclear program, and

Browns Ferry has remained shut down until adequate corrective actions have been defined and undertaken.

On September 17, 1985, the Nuclear Regulatory Commission (NRC) requested, pursuant to 10 CFR 50.54(f), that TVA submit information about its plans for correcting the problems at Browns Ferry and for correcting problems in the overall management of its nuclear program. In response to this request, TVA prepared a Nuclear Performance Plan, which identifies the root causes of the problems in the management of TVA's nuclear program as well as specific Browns Ferry Unit 2 problems and describes TVA's plans for correcting those problems. Although many other programs associated with Unit 2 are applicable to Units 1 and 3, the plan is specifically directed to Unit 2. An evaluation of the results and conclusions drawn from the Unit 2 programs will be necessary to determine applicability to Units 1 and 3.

The staff expects Browns Ferry Unit 2 will be ready for operation in the fall of 1990. Implementation of the environmental qualification program and completion of the plant modifications for the Post Accident Sampling System and the Automatic Depressurization System are the critical path items. TVA is developing a plan for restarting Unit 3; with a goal of restart in January 1993. TVA has not announced plans for restart of Unit 1.

SEQUOYAH

Sequoyah Unit 1 shut down on March 17, 1990 for the Cycle 4 refueling outrage. Restart is scheduled for May 22, 1990.

Sequoyah Unit 2 is operating at full power. The unit restarted from its Cycle 3 refueling outrage in May 1989. It is scheduled to shut down for its Cycle 4 refueling outrage in October 1990.

The NRC approved the Sequoyah Nuclear Performance Plan (SNPP) for the restart of Unit 2 in its Safety Evaluation Report (SER) issued on May 18, 1988. The SER Supplement 1 on Sequoyah Unit 1 restart was issued on February 3, 1989. Unit 2 restarted from its extended outrage in May 1988 and Unit 1 restarted in November 1988. Both units have since set records for the number of continuous days of power operation for a TVA generating unit of greater than 500 MWe.

WATTS BAR

On February 20, 1985, TVA provided certification that design, construction, testing and preparation for operation of Watts Bar Nuclear Plant (WBN) Unit 1 had essentially been completed in accordance with the Final Safety Analysis Report (FSAR) and other licensing documents. At that time, the NRC had essentially completed its review of the WBN FSAR and documented its evaluation in the Safety Evaluation Report (SER) and its supplements. In April 1985, the NRC became aware of numerous TVA employee concerns (approximately 5000) and some of these concerns were expressed directly to the NRC. On April 11, 1986, TVA rescinded its certification that Watts Bar, Unit 1 was ready for fuel load. On May 22, 1989, TVA submitted its plans for the licensing of Watts Bar Unit 1 in the Watts Bar Nuclear Performance Plan (WBNPP). At present, the applicant is developing a detailed schedule for implementing corrective programs and completing Unit 1. The staff expects Unit 1 to be ready for fuel loading in late 1991. The staff's review of the various corrective programs is continuing and a number of team inspections are underway. Unit 2 is approximately 85 percent complete and equipment is being maintained. No startup schedule for Unit 2 has been established by TVA.

HIGH LEVEL WASTE

Mr. BEVILL. The Department of Energy has made major changes in the nuclear waste program. Currently DOE estimates the repository will not be able to accept spent fuel until 2010—a full 12 years later than provided in the 1982 Nuclear Waste Policy Act.

Explain how these delays in the program affect the NRC effort and what future impact is expected. Any one of you may comment on that.

Mr. CARR. The DOE's program and our program—we have adjusted our program and taken a cut in our high-level waste program with respect to the DOE slow-down. Actually, the work that we have to do at the NRC is not all that dependent on the DOE program. My personal concern would have been that if DOE had held to the 1998 time frame, the NRC would have been behind in its work. We had a lot of work to do in rulemaking. We had to oversee the quality control for the respository. So we had a lot of work in just paperwork, if you will, in getting our own organization into place to license this effort.

Their delay gave us a chance to catch up. We have adjusted our program to the DOE schedule. The DOE program hasn't really slowed down that much yet, but we have got it under surveillance. If it does slow down, then we will naturally slow ours down so that we—but we don't want to be the controlling path for the DOE licensing.

I guess the short answer is that we have adjusted our program to meet their program as they have slowed it down. But our program was behind anyway and we needed to catch up. We have to review all the things that they get ready to do for a quality control standpoint. So anything they do, we are responsible for making sure the quality control is such that we can license it.

LICENSING REFORM

Mr. Bevill. Do you think you will be able to testify here next year that you are ready to license nuclear plants safely so that they can get on the line within ten years from the time they put their application in?

Mr. Carr. I think we can do that now. Yes, sir. All we are waiting for is that application. I am confident that we can take care of it—that we have done everything we can do to cut all the delay out of the licensing process.

Mr. Bevill. Do you think, then, that between now and the next time you come in here that you could accomplish that in a nine-year period?

Mr. Carr. We don't have any control over the construction. Some plants——

Mr. Bevill. You have got control over everything. You have got the power to license. When you've got that, you have got the power.

Mr. Carr. I guess we have control over delaying it, but we don't have control over accelerating it. Some plants have been built in six years of actual construction time. Looking at Limerick and St. Lucie and those that had a good construction record—if you get that kind of a constructor and that kind of a builder we don't think that our piece of the action will take more than two years in the best case and more than three years in the worst case. So we think that certainly eight or nine years is a reasonable time from the start to the finish of construction of one of the certified plants.

Mr. Bevill. Don't you think if you do that one time you are going to see the utilities start applying for the building of nuclear plants?

Mr. Carr. Yes, sir.

Mr. Bevill. Would you put your money into an application based on what has happened in the past to build a nuclear plant? Would you be willing to invest your private funds in one?

Mr. **Carr.** From a personal standpoint, if I had the money I would buy up all the unfinished plants because I think ultimately they are going to be finished.

Mr. **Bevill.** Well, you are an optimist, aren't you?

Mr. **Carr.** Well, I think the country needs electricity.

Mr. **Bevill.** I do, too.

Mr. **Carr.** And they are going to need all sources of it—wind, solar, oil, coal—and we are still going to run out some day.

Mr. **Bevill.** And we are going to be in trouble in 1995 on electricity?

Mr. **Carr.** If the utilities don't start building something pretty soon we are going to be in trouble in the next ten years—serious trouble. The margins are coming down.

Mr. **Bevill.** Yes.

Does anybody else have anything?

[No response.]

Mr. **Bevill.** I want to thank you for Ms. Maria Lopez being permitted to help us so much. I see her in the audience there.

Mr. **Rogers.** That's Commissioner Roberts, I think.

Mr. **Bevill.** From Commissioner Roberts.

Mr. **Carr.** We will pass the word along on that.

Mr. **Bevill.** Commissioner Roberts and his office. She has been a great help to my staff and we appreciate it very much and we appreciate Commissioner Roberts.

Mr. **Carr.** I certainly will convey that to him.

Mr. **Bevill.** Maybe we'll have a bouquet to hand you next time, Mr. Rogers.

Mr. **Rogers.** Fine.

Mr. **Bevill.** Does anybody else have anything?

[No response.]

Mr. **Bevill.** We will have questions for the record.

We appreciate the direction in which you are headed and hope that we can be of help to you in moving along.

Mr. **Carr.** Yes, sir.

Mr. **Bevill.** Thank you very much.

Mr. **Carr.** Thank you very much.

Mr. **Bevill.** The committee stands adjourned until 10:00 in the morning.

[Questions for the record and the answers thereto follow:]

STANDARD REACTOR DESIGNS

MR. BEVILL. How many applications for standard design have been received and how many are anticipated?

CHAIRMAN CARR:

The NRC has received three applications for the review of standard designs, one from General Electric, one from Combustion Engineering and one from Westinghouse. All three designs are of evolutionary light water reactor type. GE and CE have applied for design certifications, and Westinghouse for preliminary design approval only.

At least seven additional applications are anticipated in the future. Four of them would be for advanced passive LWRs and the others would be for advanced non-LWRs. The vendors for passive LWRs are Westinghouse, ASEA Brown Boveri, GE and CE. The vendors for advanced non-LWRs are General Atomic, GE and Atomic Energy of Canada Limited.

In addition to the standard designs, the NRC is currently reviewing the Electric Power Research Institute Requirements Document for evolutionary LWRs and anticipates reviewing the Requirements Document for passive LWRs in the near future.

MR. BEVILL: Please advise the amount of resources that are required for these reviews and what priority is used for the reviews.

CHAIRMAN CARR:

In fiscal year 1991 for the evolutionary and advanced reactor reviews, we currently have budgeted 35 direct FTE and about $3 million. In fiscal year 1990 we have been at 24 direct FTEs and $1.6 million. We are proposing an increase in this next budget to dedicate additional staff and contractor support for the certification.

The Commission is currently re-evaluating the current schedules for design certification reviews. Budgeted resources for these reviews will be considered in this re-evaluation.

The current Commission schedule gives equal priority to the review of General Electric and Combustion Engineering evolutionary light water reactors and the Electric Power Research Institute Requirements Document for evolutionary LWRs until there is a domestic interest in a specific standard design. Also, the Commission plans to give higher priority to the review of EPRI Requirements Document for advanced passive LWRs compared to the review of specific passive plant designs. It is too early to establish review priorities for advanced non-LWR designs.

MR. BEVILL: Please describe the process and timing of each review that has been initiated or that is anticipated to be initiated.

CHAIRMAN CARR:

The process for the review of a standard design that would lead to a certified design includes the following major steps:

First, an applicant, submits a proposed Licensing Review Basis document, which addresses the review process and key technical issues, to ensure that the review proceeds in an orderly and efficient manner. Second, NRC reviews the LRB document and issues it in a final form. Third, the applicant submits a safety analysis report and associated information required by 10 CFR Part 52. Fourth, NRC reviews the safety analysis report and other information and issues Draft Safety Evaluation Reports. Fifth, NRC issues Safety Evaluation Reports and Final Design Approval after resolution of open issues, and six, NRC issues a Design Certification after rulemaking.

The current schedule is to complete the Final Design Approval for the General Electric advanced boiling water reactor by December 1990 and issue the Design Certification by March 1992. For the Combustion Engineering System 80 plus design, we expect to complete the Final Design Approval by December 1991 and issue the Design Certification by March 1993.

Westinghouse has applied for only a Preliminary Design Approval and not the certification of its RESAR/SP 90 design. The review process for SP 90 will be similiar to the design approval process for GE and CE. The Preliminary Design Approval for the SP 90 is scheduled to be issued in June 1990.

The review process for the EPRI Requirements Document includes the following major steps: First, EPRI submits the Requirements Document. Second, NRC reviews the document and issues the Draft Safety Evaluation Reports. Third, after resolving open issues, NRC will issue the Final Safety Evaluation Reports.

The Safety Evaluation Report on the requirements document for evolutionary light water reactors is scheduled to be issued in March 1991. For advanced passive LWRs, the report is scheduled to be issued in February 1992.

The Commission and staff are currently re-evaluating the above schedules.

MR. BEVILL: What is the status of your review of the advanced large light water reactor designs?

CHAIRMAN CARR:

The review of General Electric Advanced Boiling Water Reactor is well underway. The Licensing Review Basis document, addressing the review process and key technical issues, was issued in August 1987. Draft Safety Evaluation Reports on several chapters have already been issued. Proposed modifications to existing regulations are currently under review by the Commission and the ACRS.

The review of Combustion Engineering's System 80+ is just beginning. The review of the LRB document and initial design information is in progress.

The Preliminary Design Approval review of Westinghouse's RESAR/SP 90 is complete and the Safety Evaluation Report is in preparation.

MR. BEVILL: What is the status of your review of the advanced smaller light water reactor designs?

CHAIRMAN CARR:

Presently the NRC does not have an application for certification of a small advanced light water reactor design. However, both Westinghouse and General Electric are in the process of developing mid-sized, 600 MWe, passive light water reactors for certification in the mid-1990's. Also, the Electric Power Research Institute is in the process of developing a requirements document for the passive plants which the staff will be reviewing in the near future. Although the NRC staff will participate in early dialogue with plant designers in accordance with the Commission's Policy Statement on Advanced Reactors, the actual passive plant design reviews will not begin until the requirements document has been reviewed and approved by the NRC.

MR. BEVILL: The nuclear industry and the Department of Energy indicated that they are working with the NRC to obtain a certification for various advanced reactor designs. Does NRC agree with the objective of having a certified advanced light water reactor design in the 1990's?

CHAIRMAN CARR:

Yes, the present schedule for completing certification of the two advanced light water reactor designs presently being reviewed is in the mid-1990's timeframe.

MR. BEVILL: There has been discussion with regard to the need for a certification for the nonnuclear balance of plant design. What are your views with regard to a certification for the balance of the plant?

CHAIRMAN CARR:

In April 1989, the NRC promulgated 10 CFR Part 52. The intent of this rule was to provide for the early resolution of licensing issues and enhance the safety and reliability of nuclear power plants. This regulation requires applications for certification of a nuclear power plant design which is an evolutionary change from existing light water reactors to provide an essentially complete nuclear power plant design, except for site-specific elements such as the service water intake and the ultimate heat sink. The Commission believes that this is necessary to receive the full benefit from the certification process -- early resolution of issues and enhanced safety and reliability. Long experience in operating light-water designs has demonstrated the potentially adverse safety effects the balance of plant can have on the nuclear island. Given this experience, certification of these designs should be based on a consideration of the whole plant, or else the certifications of those designs will lack that degree of finality which the Commission intended in promulgating 10 CFR Part 52.

The final rule provides the opportunity for certification of designs of less than complete scope, if they belong to the class of advanced designs. However, certification of an advanced design of incomplete scope will be given only after showing, using a full-scale prototype, that the balance of plant cannot significantly affect the safe operation of the plant.

MR. BEVILL: Please describe the difference between the U.S. and other countries with regard to the use of standard designs and indicate the reason for these differences.

CHAIRMAN CARR:

The NRC continues to encourage and endorse standard plant designs through its policy statement, "Nuclear Power Plant Standardization" dated September 15, 1987, and its new licensing procedures in 10 CFR Part 52, "Early Site Permits, Standard Design Certifications, and Combined Licenses for Nuclear Power Reactors." This rule provides incentives to utilities that select standard designs.

France is the only country that has achieved a significant degree of standardization of nuclear power plants. It was able to achieve that degree of standardization because it has one national utility, one reactor manufacturer, and two turbine-generator suppliers. However, even France has five different PWR designs and some gas-cooled and liquid metal cooled reactors. In the U.S. and most other countries, utilities have the option of choosing amongst a number of reactor manufacturers, turbine-generator suppliers, and architect-engineering firms. Competing market forces, the choice of multiple vendors and designs, and the lack of substantial incentives to standardize in the past made it difficult to achieve a significant degree of standardization.

ADVANCED REACTORS

MR. BEVILL: What is the status of your review of the Advanced High Temperature Gas Reactor Design.

CHAIRMAN CARR:

A draft Preapplication Safety Evaluation Report (SER) for the Modular High Temperature Gas Cooled Reactor was issued in March 1989 (NUREG-1338). This report is being revised to address key licensing issues, such as containment requirements and emergency planning requirements. The Safety Evaluation Report will be presented to the Commission for review and approval by November, 1990.

A report from DOE received in December 1989 that addressed the rationale for the differences in containment designs between the New Production Reactor (NPR) version of the MHTGR and the civilian version, and provided alternative containment designs for the civilian version, is currently being reviewed. Further, NRC interactions with DOE on the MHTGR will be based on a licensing plan from DOE expected in the next several months.

MR. BEVILL: What is the status of your reviews of the Advanced Liquid Metal Reactor (ALMR) designs?

CHAIRMAN CARR:

A draft Preapplication Safety Evaluation Report, for the Power Reactor Inherently Safe Module, PRISM, ALMR design was issued in September 1989, NUREG-1368. This report is being revised to address key licensing issues, such as containment requirements and emergency planning requirements. The SER will be presented to the Commission for review and approval by November, 1990. DOE and its contractor will respond to the safety issues identified in the SER in two forthcoming amendments to their Preliminary Safety Analysis Report. A SER on the Safe Advanced Fast Reactor, SAFR, design, to document the review performed to date, will be pursued as a low priority activity now that further work on the SAFR design has been terminated by DOE.

The NRC staff plans to review and evaluate the licensing aspects of DOE's Integral Fast Reactor metal fuel program in FY-1991. Evaluations are expected to include, but not be limited to, chemical reprocessing, on-site versus off-site reprocessing, the potential for inadvertent recriticality, and radioactive source term considerations.

HIGH-LEVEL WASTE

MR. BEVILL: Describe the expected NRC relationship with the newly established MRS Commission.

CHAIRMAN CARR:

The Nuclear Regulatory Commission staff provided testimony to the Monitored Retrievable Storage Review Commission on NRC's role and responsibilities under the Nuclear Waste Policy Act and NRC's views on the need for an MRS. This information was provided for the MRS Commission's use in preparing its November 1989, report to the Congress entitled, "Nuclear Waste: Is There a Need for Federal Interim Storage?" The MRS Review Commission was dissolved after issuance of its report.

MR. BEVILL: Describe the expected NRC relationship with the newly established Office of Special Negotiator for Commercial Waste Management.

CHAIRMAN CARR:

As provided under Section 403(c) of the Nuclear Waste Policy Amendments Act of 1987, the Negotiator may solicit and consider the comments of the NRC or any other Federal agency on the suitability of any potential site for site characterization. This subsection also provides, however, that "nothing in this subsection shall be construed to require the ...Nuclear Regulatory Commission, or any other Federal agency to make a finding that any such site is suitable for site characterization." Section 403(d)(4) also provides that notwithstanding any negotiated agreement between the Negotiator, the Nuclear Waste Technical Review Board, and a potential host state or tribe, DOE may construct a repository or monitored retrievable storage facility at a site agreed to only if authorized by the Nuclear Regulatory Commission.

MR. BEVILL: Describe the specific tasks the NRC plans to perform in support of the commercial nuclear waste program.

CHAIRMAN CARR:

The specific tasks the NRC currently plans to perform in support of the commercial high-level nuclear waste program will be performed by a combination of NRC staff and the Center for Nuclear Waste Regulatory Analyses, CNWRA. The CNWRA is a Federally-Funded Research and Development Center under contract to the NRC to provide technical assistance and conduct research for NRC's high-level nuclear waste program. These tasks are as follows:

The NWPA, as amended, requires that the NRC complete the review of the HLW repository license application within three years after submittal. To meet that requirement, the NRC will develop regulatory requirements and extensive guidance for DOE on potential licensing issues as well as a format and content guide for use by the DOE staff when preparing the license application. The NRC will consult with the State of Nevada, the Nuclear Waste Negotiator, and the Nuclear Waste Technical Review Board. It will also be necessary for NRC to review and comment on any amendments to the DOE Mission Plan and Project Decision Schedule.

Another task, to develop technical assessment capability for repository licensing reviews, involves the development of methodologies, models, codes and review strategies for use by the NRC staff in evaluating DOE's site characterization activities and repository license application. These methodologies, models, codes and strategies are necessary to provide the Commission with sufficient technical basis with which it can determine the adequacy and safety of the repository.

Developing and implementing quality assurance programs involves NRC evaluation and oversight of DOE's quality assurance programs for site characterization activities, including conducting audits of a sample of DOE and DOE contractor quality assurance programs. The objective is to identify and resolve concerns with DOE's repository QA program before significant data collection commences during site characterization.

The conduct of pre-licensing reviews includes the review of updates to DOE's statutory Site Characteriza-tion Plan for the Yucca Mountain site and of associated study plans and references. It also includes the review of technical data collected during investigations of the Yucca Mountain site. An important aspect of these pre-licensing consultation reviews is to help identify any site characterization activities that could inadvertently result in disqualifying the site from a licensing perspective.

The review of transportation package certificate applications consists of pre-application efforts with DOE on spent fuel transportation package designs. The first application is expected to be submitted to NRC in FY 1992. Prior to submission of the application, NRC will exchange information and technical data with DOE concerning the design, testing, and certification of the transportation package, as well as interact with DOE and its contractors on their plans to develop and test other package designs.

The research needed to support NRC's pre-licensing activities will continue in order to identify critical regulatory issues and to help ensure that technical problems associated with these issues are understood sufficiently to support licensing decisions. More specifically, efforts will address waste package performance and likely failure mechanisms, performance of key features of an underground facility such as borehole and shaft seals and performance of backfill and packing materials, radionuclide transport, performance assessment methodologies, and interaction between engineered and material components of HLW repositories.

Legal support will be provided to NRC staff in all aspects of the HLW program, as necessary. This support will include rule development, legislation review, providing guidance to staff following any court decision related to the repository, and responding to Congressional inquiries concerning NRC's HLW program.

Atomic Safety and Licensing Board Panel support will provide input and support to streamlining the licensing process and an automated document control and search system, the Licensing Support System for the repository licensing hearing. A pre-application board is expected to be appointed six months prior to access to the LSS and will rule on petitions for access to the LSS and disputes that may arise. DOE expects that access to the LSS could be mid to late 1993.

The Advisory Committee on Nuclear Waste reports to the Chairman of the NRC and provides independent advice to the Commission on all aspects of nuclear waste management within the purview of NRC's regulatory responsibilities. The primary emphasis will be on disposal, but will also include other aspects such as transportation, storage and safeguarding of high-level nuclear waste.

The Licensing Support System is designed to ensure effective discharge of NRC's responsibilities under 10 CFR Part 2, Subpart J, as they pertain to loading and subsequent use of the Licensing Support System prior to and during the NRC's high-level waste licensing proceeding. The system will assist the NRC in meeting the three year time period for making a licensing decision.

Interaction and liaison with state, local, and Indian tribal representatives on matters concerning NRC's HLW program will also be provided.

With regard to a Monitored Retrievable Storage facility, the NRC plans to interact with DOE, as a potential applicant, as appropriate. If the NWPAA is modified so that an MRS facility license application is submitted in the near-term, the NRC would modify its current plans to ensure that its assigned regulatory responsibilities are met.

In addition to the tasks I have just described, which are directly related to DOE's high-level waste program, the NRC will also support the commercial nuclear waste program by reviewing and approving independent spent fuel storage at nuclear reactors.

MR. BEVILL: Describe the proposed mechanism of financing the NRC commerical waste program by use of the Nuclear Waste Fund. What alternative financing mechanisms were proposed?

CHAIRMAN CARR:

Under NRC's proposed appropriations legislation, the Nuclear Waste Fund, consistent with the provisions of the Nuclear Waste Policy Act, would finance the NRC commercial nuclear waste program activities related to the disposal of high-level radioactive waste and spent fuel in a geologic repository. This would be accomplished by the Congress appropriating monies directly from the Nuclear Waste Fund to the NRC as part of its appropriation to the NRC. This is the same process that was used for fiscal year 1990.

There were two alternatives. The first is funding the NRC nuclear waste program by appropriating funds from the Nuclear Waste Fund into a separate NRC appropriation account. This approach was not proposed because the current proposal accomplishes all of the objectives without the administrative burden of another appropriation. The second would re-establish a Memorandum of Understanding between NRC and DOE. This would require NRC to receive full appropriations from the general fund and then deposit monies received from the DOE as fees for NRC activities defined under the Nuclear Waste Policy Act into the Treasury.

Both the NRC and the Office of Management and Budget believe that a direct appropriation to the NRC from the Nuclear Waste Fund for our high-level nuclear

waste activities, rather than handling this matter through the DOE appropriations process, more clearly identifies the funding with the agency expending the resources.

MR. BEVILL: Please describe the Licensing Support System (LSS) being established in support of the waste repository.

CHAIRMAN CARR:

The LSS is an electronic information management system which will contain the relevant licensing documents of the Department of Energy, the Nuclear Regulatory Commission, and other parties to the Commission's high-level waste repository licensing proceeding. The objective of the LSS is to facilitate the thorough and efficient review of the DOE license application. It will provide the capability to conduct an electronic full text search of a comprehensive and common pool of relevant licensing information. This will assist in the review of this technical information and in the preparation of regulatory products such as rulemakings and technical positions. It will also eliminate the time-consuming physical identification and distribution of documents during discovery which normally occurs after the license application is submitted. Finally, the LSS will be used during the evidentiary hearing on the license application, both for document review and for the electronic transmission of all filings and issuances during the hearing.

MR. BEVILL: When will the Licensing Support System (LSS) be required considering the announced 12-year delay in the nuclear waste repository?

CHAIRMAN CARR:

The Commission believes that operation of the first capture facility of the LSS is needed by 1993 to facilitate the identification and early resolution of problems that normally occur in the development of an electronic information management system of this scope. Demonstration of the LSS will allow future expansion of the LSS in a cost effective manner to reflect the pace and needs of the repository program. Such a development schedule will ensure that the LSS will be available to meet the primary objectives of the system as approved in the Commission's rulemaking which include the early technical review of high priority documents by DOE, NRC, the State of Nevada, and others before DOE's license application is received, the document discovery needs of the participants in the Commission's high-level waste licensing proceeding, and the electronic transmission of filings and issuances, and for review of the evidentiary record, during the adjudicatory hearing on the DOE license application.

The Department of Energy's revised repository schedule shifts the date for submitting its license application to the NRC from 1995 to 2001. In recognition of this, the LSS development schedule has been substantially cut back while still meeting the primary objectives of the system. The original LSS schedule provided for the loading of 12 million pages into the LSS database by 1993 and 20 million pages by 1995. To achieve this, capture facilities would have been established and operated starting in FY 1990. The revised LSS loading schedule has been substantially scaled back to reflect the changes in the repository program. For example, instead of 12 million pages to be loaded by 1993, only 0.5 million pages will now be loaded at this time, using a single capture facility. To assure that the LSS users gain maximum benefit from the limited database, only highest priority documents will be loaded. This loading will be done consistent with the Commission's topical guidelines which are scheduled to be finalized in FY 1990/1991. Access to these high priority documents for repository technical review would be available in mid-late 1993. The operation of this first capture facility of the LSS will also ensure the timely resolution of problems that normally occur in the installment and operation of any new computer system of this type and size. The "lessons learned" from operating and using this first facility will be taken into account as the balance of the system is implemented. The LSS will be expanded at a rate that reflects the pace and needs of system users and the need to electronically capture about 20 million pages of documentary material between 1994 and 2001.

The revised LSS development schedule has been planned to minimize overall costs. For example, a minimum number of additional document processing facilities in 1993/1994 will establish a relatively even production schedule for capturing the large backlog of documents that now exist, plus those that will be created between now and 2001. An even production schedule will minimize the capital expenditure for production facilities. Also, an "open architecture" design has been incorporated into the LSS to avoid concerns over technological obsolescence and to allow tried and tested new developments to be incorporated easily. In addition, by loading the highest priority documents first, resources needed to rule on document discovery disputes will not be needed until the period immediately preceding the submission of the DOE license application.

Commissioner Curtiss has the following separate views on the timing of the Licensing Support System.

MR. CURTISS:

The LSS was originally conceived primarily as a means of providing early document discovery for potential parties to the high-level waste (HLW) repository licensing proceeding and, secondarily, as a tool for DOE and NRC technical staffs to manage the large number of technical documents that will be generated during the course of the repository program.

When the Commission approved the final rules establishing the LSS, it anticipated that DOE's application for the repository would be filed in 1995 and that early loading, operation of, and access to the LSS would provide, at most, two to three years of discovery and document access for the parties to the repository licensing proceeding. At the time, the Commission concluded that this was sufficient time to undertake the necessary discovery. In addition, the Commission agreed to manage and administer the LSS only if DOE would fund the design, procurement, operation, and maintenance of the LSS from DOE's appropriations.

There have been a number of developments since the adoption of the final LSS rules that, in my judgment, point to the need for the Commission to reassess the timing of full-scale development, procurement, loading, operation of, and access to the LSS. In particular, I would call the Committee's attention to the following:

First, DOE has announced substantial delays in its schedule for licensing the repository. Rather than filing its application in 1995 -- as the Commission anticipated when it promulgated the rules establishing the LSS in 1989 -- DOE now plans to undertake a more deliberate site characterization process and to delay its application until about 2001. While these changes in DOE's schedule have led to some minor adjustment in the proposed rate at which documents would be loaded into the LSS, there has been no change in the proposed date of operation for the LSS -- even though the submission of DOE's application for a construction authorization for the repository will now be delayed six to seven years. In the face of these developments, I believe that consideration should be given to delaying full-scale development and operation of the LSS for the following reasons:

(a) Computer technology is in a constant state of change, particularly in the area of information retreival. An LSS that is fully developed and implemented on the basis of 1990-92 technology is not likely to reflect the state-of-the art technology that may well be available in the mid to late 1990's, when the LSS will be needed. Delaying the program would permit the NRC to take advantage of any such advancements in the state-of-the-art, perhaps for less than what we would spend on such a system today.

(b) When the Commission promulgated the LSS rules, it expected that the LSS would go into operation sometime around 1993 and would thereby provide about two to three years of pre-application discovery for potential parties to the repository licensing proceeding. The current proposal to initiate operation of, and grant access to, the LSS eight years prior to the filing of an application by DOE would, in turn, result in eight years of pre-application discovery and ten to eleven years of discovery altogether. Such an approach would also require the establishment of a Pre-Application Licensing Board (PALB) to rule on access issues and to settle discovery disputes throughout that extended discovery period. Such a formal, lengthy discovery process was never contemplated by the Commission, nor do I think it is necessary in order to meet reasonable discovery needs. Additionally, I am concerned that the constitution of a PALB at such an early stage will not only require the commitment of resources to this task, at a time when our FTEs are quite limited, but will, in addition, unnecessarily formalize the pre-licensing process at a time when the emphasis should be on the kind of informal and open communication between DOE, NRC, and the State that the Nuclear Waste Policy Act envisioned during this phase of repository development.

(c) Earlier cost projections for the LSS were based on DOE's original repository licensing schedule. Those projections did not account for the operation and maintenance costs for the additional six or seven years of LSS operation that is now proposed. In short, operation of the system six to seven years earlier than necessary will lead to six to seven years of additional operation and maintenance costs.

Second, the Commission is currently reexamining the list of topical guidelines that define which documents are to be placed in the LSS. Currently, the topical guidelines would require the inclusion of documents addressing topics that, in my judgment, fall outside the scope of any reasonable licensing proceeding for a geologic repository, including, among other things, documents addressing -- (i) alternatives to Yucca Mountain; (ii) alternatives to geologic disposal; and (iii) national transportation routing. Both the NRC and DOE are statutorily foreclosed from considering alternatives to Yucca Mountain, as well as alternatives to geologic disposal. Accordingly, I see no need to include such documents in the LSS. Similarly, the issue of national transportation routing -- while an important issue -- is simply not relevant to the issue to be addressed in our licensing proceeding: the suitability of the Yucca Mountain site. For this reason, I see no need to include documents on national transportation routing in the LSS either. Regardless of how the Commission ultimately resolves these issues, however, the Commission is currently awaiting the staff's analysis of what topics should be included in the topical guidelines. Until we complete our action on this initiative, it would be premature in my view to begin loading documents in the LSS.

Finally, DOE has not yet agreed to fund the loading, operation, and maintenance of the LSS. Since the Commission expressly conditioned its original agreement to administer the LSS on DOE's funding the entire system, and since the costs of loading, operating, and maintaining the system are likely to be rather large, I do not believe that the Commission should proceed with development and operation of the LSS until a clear and satisfactory resolution of the funding issue is reached.

MR. BEVILL: What is the estimated cost of this computerized Licensing Support System (LSS) and why should it not be delayed until required?

CHAIRMAN CARR:

The original Department of Energy cost estimates for the hardware, software, and labor associated with the design, development, and operation of the LSS from 1988-1998 was approximately $200 million. Given the revised repository schedule, this cost estimate will need to be redone.

As mentioned earlier, the new LSS development schedule has substantially delayed the implementation and loading of the LSS consistent with its need for pre-license application technical review and the need to process about 20 million pages of documentary material by 2001.

MR. BEVILL: Does the Commission have any concerns about its ability to maintain a proper relationship with DOE during the licensing process, particularly with regard to work with DOE in order to improve the quality assurance aspects of the DOE program.

CHAIRMAN CARR:

The NRC does not have any concerns about its ability to maintain a proper relationship with DOE during the prelicensing or licensing phase of the High-Level Waste repository. With regard to the quality assurance aspects of the DOE program, NRC has and will continue to adhere to the principals of the Ford

Amendment Study, NUREG-1055, "Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants" which calls for placing the responsibility for achieving and assuring the quality and reliability of the facility to be licensed on the license applicant which in this case is DOE. NRC has provided guidance to DOE through prelicensing consultations, meetings, document reviews, and observations of DOE audits and surveillances. However, NRC has strongly maintained that it is the responsibility of DOE to develop its QA program. It is only after DOE has officially notified NRC of its approval of the QA program that NRC will take an independent position on the acceptability of the program. NRC has also stressed to DOE that a successful QA program is the cornerstone of the licensing process because it is the way in which DOE can ensure the acceptability of the scientific data that will be used in the licensing process.

LICENSING REFORM

MR. BEVILL: How would the establishment of "hold points" be consistent with the stated policy and purpose of the license reform rule?

CHAIRMAN CARR:

In 10 CFR Part 52, a means is provided to verify and assure that construction and operation will be in accordance with the combined license which is consistent with the concept of "hold points" referred to in the question. In particular, 10 CFR 52.79(c) states: "an...application for combined license must include the proposed tests, inspections, and analyses which the licensee shall perform and the acceptance criteria therefore which are necessary and sufficient to provide reasonable assurance that, if the tests, inspections and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the combined license." Furthermore, the rule allows for, but does not require a final hearing prior to granting the operating license to provide public participation in the finding that all the acceptance criteria have been met.

MR. BEVILL: Does the Commission believe construction must cease in order to perform the inspections, tests, and analyses needed to assure plant conformance?

CHAIRMAN CARR:

No, for standardized plants licensed under 10 CFR Part 52, the tests, inspections, and analyses covered under Part 52.79(c) can be performed while construction is ongoing. This concept was utilized in a voluntary licensee program for the Vogtle 1 and 2 Units and was referred to as the Readiness Review Program. Under the Program the licensee performed certain inspections, tests and analyses for designated sections of the construction program to ensure that the construction commitments of the SAR were satisfied. With certification by the licensee of successful completion of that work segment, the NRC inspectors conducted selective examinations to verify adequacy of the licensee's review. All this was accomplished without stopping construction.

A process similar to that which was used for Vogtle is envisioned. The difference would be that the details of these tests, inspections and analyses will be submitted to the NRC and approved prior to the beginning of construction of standard plants.

MR. BEVILL: The Committee is encouraged by your efforts on licensing reform. However, what is your position with regard to requiring a second adjudicatory hearing prior to issuing an operating license? Is there, in fact, a legal requirement for a second hearing?

CHAIRMAN CARR:

No, there is no legal requirement that a second adjudicatory hearing ordinarily be held prior to the commencement of operation of a plant which has been constructed and will operate in conformity with the conditions of the combined license and in conformity with the provisions of the Atomic Energy Act and the applicable rules and regulations of the Commission.

The final rule provides for an opportunity for an interested person to request a second hearing in a very limited area. This area is solely whether the acceptance criteria in the combined license have been met. The Commission itself in its judgment would decide whether or not there should be any hearing and, if so, on what precise issue. A hearing, if any, would be held only if in the judgment of the Commission itself the petitioner has presented substantial evidence of an actual safety problem which must be resolved prior to operation and there is no other lawful and practical approach but some type of hearing to assist the Commission in resolving the issue. In this regard, applicable law explicitly provides that no hearing is legally required for decisions based solely on the straightforward results of inspections and tests. If the licensee and the NRC have developed sufficiently detailed and comprehensive acceptance criteria in the combined license, and the licensee has satisfied them in constructing the plant, the likelihood that a hearing would be required prior to operation is extremely small. As a practical matter, if there is a safety issue associated with satisfying any acceptance criteria, the straightforward approach would be to fix the problem if one exists, and no hearing at all is needed to do that.

MR. BEVILL: If a second adjudicatory hearing is required, what effect will this have on potential license applicants?

CHAIRMAN CARR:

As indicated earlier, no second hearing is ordinarily required and the Commission believes that under the final rule the likelihood that a formal hearing would he required before operation is small. We are not in a position to judge with certainty what effect the possibility of a second hearing would have on potential license applicants.

BELOW REGULATORY CONCERN

MR. BEVILL: Describe your policy with regard to "below regulatory concern" waste.

CHAIRMAN CARR:

The Commission believes that specific waste streams may pose such small risks to public health and safety that it is appropriate to exempt such waste from further regulatory control. Certain waste streams may already be legally disposed without regard to radioactivity content under NRC regulations (e.g., slightly contaminated biomedical wastes as per 10 CFR 20.306). In response to Public Law 99-240, NRC developed and published, in 1986, a Statement of Policy and Procedures which outlines the criteria for considering rulemaking petitions to exempt certain other waste streams from regulatory control. Specifically, this Statement set forth fourteen criteria which if met would allow expeditious action on a petition to exempt certain waste streams from regulatory control. These included criteria for individual and collective dose levels, the ability to characterize these waste streams on a national basis, and demonstration of the usefulness of the exemption on a national basis. The Statement of Policy and Procedures is currently a part of the Code of Federal Regulations at Title 10, Part 2, Appendix B.

Besides this 1986 policy, the Commission is developing a broad policy that would identify the principles and criteria that govern Commission decisions which could exempt radioactive material from some or all regulatory controls. This policy, the subject of an Advance Notice of Proposed Rulemaking on December 12, 1988, is intended to provide a consistent basis for all our decisions that allow radioactive material to be exempt from regulatory control. Thus, the developing policy, although applicable to Below Regulatory Concerns waste disposals, would also provide the basis for decommissioning decisions involving the release of lands, structures, or recycled materials for unrestricted use as well as decisions regarding consumer product exemptions. The policy would establish a consistent risk framework within which exemption decisions can be made with assurance that human health and the environment are protected. Such a policy would also contribute to focusing limited national resources on those risks with greatest potential impact on public health and safety. Issuance of this policy is expected in the near future.

MR. BEVILL: Why is there a need for rulemaking on "below regulatory concern" waste and what is the maximum public exposure to radiation with and without the rule? Please compare this to exposure from natural radiation.

CHAIRMAN CARR:

The need for rulemaking on "below regulatory concern" waste disposals is both explicit in the directives contained in the Low-Level Radioactive Waste Policy Amendments Act and implicit in the need to establish a consistent framework for making decisions on exempting certain quantities or concentrations of radioactive material from further regulatory control. Illustrative of this need, is that one of the most significant lessons learned from the Shippingport decommissioning project was the need for the establishment of criteria for the release of materials for unrestricted use.

Current NRC regulations address only specific types of waste, for example, biomedical, or require case-by-case approvals. NRC regulations in 10 CFR 20.302 require individual licensees to apply to the Commission for approval of proposed procedures to dispose of licensed material in a manner not otherwise authorized in the regulations. The regulations do not currently provide specific criteria for approval of "below regulatory concern" waste disposals. Consequently, such approval would have to be addressed on an case-by-case basis supported by a separate detailed technical justification developed by each licensee who requests such actions.

The maximum public exposure to radiation from disposal of BRC waste in an unlicensed facility would not exceed a small fraction of the public dose limit. The dose limit set forth in 10 CFR Part 20, specifically 500 millirem per year in the current 10 CFR Part 20, and 100 millirem per year in the final revisions to Part 20, which are currently under Commission consideration. The Commission currently is considering a 10 millirem per year individual dose criterion for BRC purposes. If this criterion, as well as other policy conditions and constraints is met in any licensing action or rulemaking, the Commission believes that the human health and the environment will be adequately protected while, at the same time, allowing limited national resources to be focused on those risks with greatest potential impact on public health and safety. This criterion would be used to make regulatory decisions in a consistent manner as to whether exemptions were granted by rulemaking or on a case-by-case basis.

Exposures occur from radiation that is natural in origin as well as from sources which involve man-made uses of radiation and radioactive material. The National Council on Radiation Protection and Measurements, NCRP Report No. 93, has estimated that the total effective dose equivalent received by each person in the United States averages about 360 millirem per year. Of this total, about 300 millirem per year, or about 83 percent of the total, is a result of natural sources, including radon and its decay products, while medical exposures contribute an estimated 53 millirem per year when averaged over the nation's population. Other man-made sources contribute the remaining 1 to 2 percent of the total exposure. Thus, if disposal of BRC waste were carried out in accordance with a 10 millirem per year individual dose criterion, the additional exposure would be less than one-thirtieth of the average exposure presently received on average by all members of the U.S. population.

DUAL REGULATION

MR. BEVILL: Please describe the Commission's position on "Dual Regulation".

CHAIRMAN CARR:

As a general matter, the Commission believes that it is wasteful of governmental resources and unnecessarily burdensome on the regulated community when more than one regulatory authority is regulating the same environmental problem, such as radionuclide emissions to the air. Even where the law gives more than one governmental entity the right to regulate, it is only sensible to minimize unnecessary duplication. For example, both the NRC and the Environmental Protection Agency have regulatory authority over emissions of radionuclides from NRC licensed facilities. Section 122(c) of the Clean Air Act directs EPA, to the maximum extent practicable, to take cognizance of NRC requirements and minimize duplication of effort and conserve administrative resources in the establishment, implementation, and enforcement of emission limitations, standards of performance, and other requirements. As a general matter, if one agency's regulatory program is doing the job of protecting the public satisfactorily, other governmental entities should, where legally empowered to do so, defer to it.

MR. BEVILL: What policy options is the Commission considering with regard to mixed waste that you believe would be most successful in resolving the problems created by dual regulation?

CHAIRMAN CARR:

We have not identified any literal conflicts or inconsistencies between NRC's and EPA's regulations for mixed waste. However, the differences between the regulations, the perception that they may be inconsistent, and the associated economic and political uncertainties have thwarted progress in developing new disposal and treatment facilities for such waste. The volume of mixed waste that will be generated in most States or Compacts is relatively small, and industry is reluctant to invest in treatment and disposal facility development with high economic risk and a burdensome dual regulatory scheme. The same political pressures that make States and Compacts unwilling to accept low-level waste from outside sources also make these parties unwilling to accept other States' mixed wastes, further complicating the development of mixed waste treatment and disposal facilities. Therefore, we expect that management of mixed wastes will continue to be a troublesome and time-consuming problem for waste generators, site developers, and regulatory agencies.

The Commission believes there are two basic policy options to resolve the problems associated with dual regulation of mixed waste. These options are: one, seek legislation to eliminate dual regulation; and two, work together with EPA to minimize dual regulation. At this time, the NRC believes that option two -- working with EPA -- is appropriate.

Given the complexities associated with dual jurisdiction, the Commission believes that some measure of progress has been achieved to date on the mixed waste issue. We nevertheless have endorsed the Office of Technology Assessment's recommendation of a high-level EPA-NRC task force as the most effective means to focus regulatory attention not only on mixed waste, but on all such issues for which our agencies have dual or overlapping authority. I had previously discussed with Adm. Reilly the establishment of such a joint EPA-NRC task force, and we are currently evaluating the merits of such an approach.

Also, the EPA and NRC staffs are continuing to work together and have developed several joint guidance documents on mixed waste. NRC is also assisting EPA in conducting a series of workshops for State, EPA, and NRC inspectors to familiarize them with mixed waste issues and to improve the regulation of storage, treatment and disposal of mixed waste.

It is our hope that the joint approach to the mixed waste issue can lead to the successful development and operation of mixed waste disposal facilities as the States move forward to carry out their responsibilities under the Low-Level Radioactive Waste Policy Amendments Act of 1985. To date, the NRC has not identified any literal conflicts in the requirements of RCRA and the Atomic Energy Act that would frustrate compliance with the joint approach established by EPA and NRC.

We are committed to making a joint approach work. However, if the joint approach proves to be unsuccessful, it may well be that further legislative consideration of this matter will be necessary to achieve the objectives of the Low-Level Radioactive Waste Policy Amendments Act of 1985.

MR. BEVILL: What impact do you believe the problems created by dual regulation will have on the selection and development of the low-level waste sites?

CHAIRMAN CARR:

As indicated in my previous response, the NRC believes that a mixed waste facility can be developed under dual regulation. In order to minimize the impacts on the site selection process, EPA and NRC issued a joint guidance document on siting guidelines for the disposal of mixed wastes on March 13, 1987. It was the view of the NRC and EPA at that time that if states and compacts observed the combined siting guidelines and keep abreast of the developing EPA location standards, the absence of final RCRA location standards should not prevent states and compacts from meeting their obligations under the Low-Level Radioactive Waste Policy Amendments Act of 1985.

However, some states and compacts have expressed concern related to LLW site development within the framework of what they perceive to be the "regulatory uncertainty" of dual regulation. NRC and EPA are continuing in their efforts to provide guidance in the implementation of their respective regulatory responsibilities in order to mitigate concerns over regulatory uncertainty. The uncertainty and added burden and costs have been identified as unacceptable business risks by at least one private sector site developer. At a minimum mixed wastes are an additional challenge for the States and Compacts, are diverting resources to special studies and separate negotiations, and create a public perception problem.

Impacts of dual regulation under the Clean Air Act are uncertain at this time but should not affect siting efforts. Developmental impacts will depend on the results of EPA's reconsideration of stayed Subpart I of 40 CFR 61.

URANIUM ENRICHMENT

MR. BEVILL: The NRC's budget for FY 1991 requests additional funds under "Nuclear Material and Low-Level Waste Safety and Safeguards Regulation" to review an application, expected to be submitted in 1990, to construct and operate the first commercial uranium enrichment facility in the U.S. What do you envision to be a realistic timetable for the NRC to act upon this application, assuming it is submitted in 1990?

CHAIRMAN CARR:

Based on the assumptions that a high quality application will be submitted in late calendar year 1990 and the application and adjudicatory hearing thereon will be for a combined construction and operating license, the NRC would expect to issue a construction permit in late 1992 and to issue an operating license in late 1996.

MR. BEVILL: What is the chief regulatory concern regarding oversight of enrichment facilities and are their hazards similar to commercial nuclear power plants?

CHAIRMAN CARR:

In its regulatory oversight of commercial uranium enrichment plants the NRC will focus on several areas -- worker and public health and safety, environmental protection, safeguarding nuclear material, and security of classified information. The primary regulatory concern related to health, safety, and environmental protection is the prevention of accidental releases of uranium hexafluoride. For safeguards the primary concern is prevention of unauthorized enrichments or diversion of materials, and for security it is prevention of the disclosure of classified information to unauthorized persons.

The hazards of uranium enrichment plants are not similar to those of commercial nuclear power plants which have large inventories of many fission and activation product radionuclides and the stored energy for dispersing them. The principal hazard of an enrichment plant is hydrogen fluoride, which is formed from the reaction of uranium hexafluoride with moisture in air. Uranyl fluoride, which is also formed from this reaction, is slightly radioactive and also presents a modest chemical toxicity hazard.

MR. BEVILL: The Administration has urged that the Uranium Enrichment enterprise be privatized. What is the present licensing arrangement with the Department of Energy for the operation of the Uranium Enrichment program?

CHAIRMAN CARR:

At the present time, there is no law, requirement, or arrangement for the NRC to regulate or license any aspect of the Department of Energy's uranium enrichment program.

MR. BEVILL: Describe the licensing consequences of turning over the operation of the Uranium Enrichment enterprise to a different entity whether it be the Government corporation or a private company.

CHAIRMAN CARR:

If legislation is passed which turns over the operation of the uranium enrichment enterprise to a different entity, and the legislation includes provisions to require NRC licensing of all enrichment facilities, the entity would have to seek licenses for the existing facilities as well as any new facilities. Since NRC is not involved with existing DOE operated enrichment facilities, the NRC does not know what changes might have to be made to these facilities to comply with NRC regulations. However, the Department of Energy has prepared a report on the costs, including NRC costs, of licensing the existing facilities, and this report along with our comments on it have been submitted to Congress. It is noted that the NRC has not budgeted any resources for licensing the DOE uranium enrichment facilities.

OFFICES OF THE INSPECTOR GENERAL AND INVESTIGATIONS

MR. BEVILL: Please describe the division of responsibility between the Office of the Inspector General and the Office of Investigations? Please show how this division of responsibility is derived from the enacted legislation?

COMMISSIONER CARR:

The Office of the Inspector General is a statutory office which is responsible for investigating NRC employees and its contractors and for audits of NRC programs. The Office of Investigations is a Commission created office which is responsible for investigating NRC licensees, permittees, applicants and vendors. The specific responsibilities of each office are set forth in 10 CFR Sections 1.21 and 1.27.

This division of responsibility is essentially the same as existed prior to the creation of the Office of Inspector General by the Inspector General Act Amendments of 1988. This allocation of responsibility was originally established to apportion responsibility between the Office of Investigations and the Office of the Inspector and Auditor which existed prior to the creation of the Office of Inspector General. However, this division of responsibility is consistent with the Inspector General Act of 1978, as amended.

RESEARCH PROGRAM

MR. BEVILL: What is the relationship between research projects and the development of rules and regulations? What are some examples of how research has directly supported the rulemaking process?

CHAIRMAN CARR:

The work carried out by the Office of Nuclear Regulatory Research (RES) provides the quantitative bases and evaluation methods needed to confirm the adequacy of existing regulatory requirments and to identify where and to what extent modifications to these requirements, including the establishment of new rules, are needed to maintain adequate protection of the public. Specific research programs are undertaken for the expressed purpose of developing new information or evaluation methods or for confirming existing data that the staff has determined to be necessary to resolve an identified safety issue. Examples of the type of data developed in this program are the characterization of radiation damage to reactor piping and structural material, the determination of corrosion and wear rates of piping and equipment, the behavior of plant and safety related components to earthquake forces, and the behavior of fission products released to the environment. RES also develops specialized, validated computer codes and models which allow predictions to be made of, among other things, the performance of safety related equipment, fuel, cladding and containment systems under abnormal plant operating conditions and accidents.

In addition, and equally important, the Research program provides the licensing and inspection staff with independent and unbiased technical information and validated evaluation methods needed to assess licensee generated data submitted in support of new license applications, on amendments to the licenses of operating plants and to facilitate staff evaluations of plant performance including assessing the safety significance of abnormal operating events and the effectiveness of related remedial actions.

Some notable examples of where research results have directly supported the development or modification of Commission requirements are:

The Station Blackout Rule revision of 10 CFR 50.63. This rule specifies requirements that all reactor licensees must meet to provide assurance that these stations can cope with loss of off-site electrical power. The extensive work that has been done in reactor risk analyses have provided the quantitative bases upon which the requirements set forth in this rule have been formulated.

The revision of 10 CFR 50 Appendix K. This rule, based on 14 years of thermal hydraulic and related research, sets forth requirements for evaluating the performance of emergency core cooling systems. This revision permits increased utilization of nuclear fuel and flexibility in plant operations which could result in ratepayer savings of several million dollars per plant with no reduction in safety.

The revision of General Design Criterion 4, 10 CFR 50, Appendix A. This change permitted the removal of certain hardware, e.g., pipe whip restraints, jet impingement shields, and hydraulic snubbers in nuclear power plants. This modification reflects the results of research on materials, accident, and earthquake phenomenology which indicated that thermally caused pipe expansion and associated stresses and cracking in power plant piping, and the unforeseen impacting between piping and pipe restraints, can be worsened by their use, thus increasing, rather than decreasing, the probability of failures under severe conditions. In addition, removal of hardware greatly facilitates inspection of critical plant piping, thus, increasing our ability to detect leaks in piping before serious breaks develop.

The ATWS Rule - revision to 10 CFR 50. This rule, based on extensive research analysis of the behavior of reactor coolant, equipment and fuels under severe transients, identified changes in plant equipment and operating procedures that would be required to ensure power plants would be able to cope with a situation in which the reactor would not be automatically shut down in response to a transient. This type of event has, for certain plants, been shown to be a source of the risk of a severe accident.

The Pressurized Thermal Shock Rule - Revision to 10 CFR 50 - Based on research results in our materials research program, a rule was issued which set forth the limitation on embrittlement of reactor vessels for operating plants to avoid pressure vessel failure due to pressurized overcooling.

NUCLEAR MATERIALS LICENSEES

MR. BEVILL: Most of the abnormal occurrences reported by the Commission to the Congress in recent years have taken place at facilities other than commercial nuclear power plants. What steps is the Commission taking to reduce the number of abnormal occurrences at facilities operated by non-utility licensees?

CHAIRMAN CARR:

Most of the abnormal occurrences at facilities operated by non-utility licensees have been medical misadministrations involving the use of byproduct material for patient care. It appears that most of these occurrences resulted from human error. To address this area, the NRC recently published a proposed rule for basic quality assurance in medical use, 55 FR 1439, January 16, 1990, that would require medical use licensees to establish a quality assurance program to prevent, detect, and correct the cause of errors in medical use. The staff is conducting a pilot program to assess the costs and benefits of the proposed rule. The staff is scheduled to submit a final medical use quality assurance rule to the Commission in March 1991.

There have also been abnormal occurrences involving industrial radiography. To help improve safety in this area, the NRC recently published a final rule which established additional safety requirements for radiography equipment and radiation dosimetry for radiography workers 55 FR 843, January 10, 1990. The staff is also working with the radiography industry to establish a third party radiographer certification program. These improvements in radiography safety and training are expected to reduce the incidence of abnormal occurrences in industrial radiography.

REACTOR PERFORMANCE

MR. BEVILL: What are the views of the Commission with regard to the use of financial incentives by public utility commissions to encourage plant performance above established levels?

CHAIRMAN CARR:

The incentive programs of state public utility commissions that are in place or have existed have resulted in only modest rewards for operation above target levels. Rewards at these levels thus far have not been a cause for substantial concern with regard to safe plant operation. This is because, without exception, under the Atomic Energy Act all utilities owning nuclear power plants are required to comply with NRC regulations and requirements whether incentive plans exist or not. These regulations, together with license conditions concerning operations and maintenance, specify an acceptable safety design and up to now, have helped to ensure that nuclear power plants are operated with attention to safety. Furthermore, the NRC, through its licensing and inspection activities, verifies that licensees are adhering to safe practices. Nevertheless, performance incentive programs have the potential to indirectly influence a licensee's approach to reactor safety issues in situations not addressed in license conditions.

The Commission believes that financial incentive programs should give equal weight to safety as to production. While financial incentives that reward production may not be an immediate threat to safety, these plans must be scrutinized carefully with a sensitivity to possible future safety risks. We are opposed to any incentive that will negatively impact safety, such as discouraging proper maintenance. For example, proper maintenance will ensure that corrective repairs should be brought to a minimum.

The Commission also believes that its indicators such as performance indicators and SALP evaluations should not be used by State regulators in determining their incentive programs.

MR. BEVILL: How does the availability of U.S. nuclear reactors compare to those in Japan and Europe?

CHAIRMAN CARR:

We are aware of the excellent availability records of many commercial light water reactors in a number of other countries. The U.S. industry, on the average, is not yet at the level of such countries as Japan and West Germany. The U.S. industry did make significant improvements in availability from 1986 through 1988. However, even though the average availability of U.S. plants in the first ten months of 1989 is below its 1988 average, the differences between U.S. and Japanese plants and between U.S. and European plants have decreased considerably. For example, based on data compiled by McGraw-Hill, the average availability for Japanese plants has decreased from 78 percent in 1986 to about 72 percent in 1989 and for European plants the average availability has decreased from 78 percent in 1987 to about 75 percent in 1989. During this time the average availability of U.S. plants has increased from 66 percent in 1986 to about 69 percent in 1989. Based on 1989 industry statistics for gross capacity factor, another measure of overall performance, nine U.S. units ranked in the top 25 in the world (excluding the Soviet Union, East Germany, Czechoslovakia, and Bulgaria, as compiled by McGraw-Hill).

MR. BEVILL: How can the NRC assist the nuclear industry in improving the reliability and availability of nuclear power plants?

CHAIRMAN CARR:

The mission of the NRC is the protection of the health and safety of the public. Reliability and availability matters are generally concerns of the licensee. Nevertheless, NRC recognizes that plant reliability and availability are important contributors to plant safety.

NRC believes its efforts to encourage or require improvements in plant maintenance will also improve industry performance in terms of reliability and availability. The NRC has a number of activities underway in the area of maintenance. The NRC initially issued a policy statement in March, 1988, which stated the Commission's expectations in the area of maintenance and identified elements of an effective maintenance program. Rulemaking was also begun. In 1989, the Commission, in acknowledgement of industry progress, suspended the rulemaking for a period of 18 months and issued a revised policy statement in December 1989. The NRC has also issued for public comment a draft regulatory guide on maintenance programs which was developed as a part of the rulemaking effort. Further, the NRC is performing team inspections to improve the conduct of maintenance within the industry.

The Technical Specification Improvements Project within NRR also will improve availability and reliability. The program on Technical Specification Improvements is a comprehensive, voluntary program of Technical Specification improvements consistent with the recommendations of separate NRC and Industry Study Groups that evaluated the entire subject of Technical Specifications. The Policy Statement encourages licensees to apply a specific set of screening criteria for determining which design and operating requirements should be included in the Technical Specifications for their plants. If licensees elect to apply the criteria to their Technical Specifications, they will also improve the Bases for the remaining Technical Specifications and apply good human factors principles in rewriting the Technical Specifications. The rewritten Technical Specifications will focus on the operator as a primary user. They will also focus on the most risk significant requirements, they will be simpler, and there will be a clear link between the technical requirements and their safety significance.

Significant improvement in safety as well as reliability will be realized as a result of implementing this program. Improvement is expected through the development of more operator-oriented Technical Specifications, improved Technical Specifications BASES, reduced action statement-induced plant transients, reduced testing at power, and through more efficient use of NRC and industry resources.

REACTOR SAFETY

MR. BEVILL: Define the roles of the Office of Nuclear Reactor Regulation and the Office of Nuclear Material Safety and Safeguards with regard to policy on nuclear reactor safety.

CHAIRMAN CARR:

The Office of Nuclear Reactor Regulation, NRR, places the primary responsibility on NRC licensees for nuclear reactor safety. NRR has a number of programs that it implements to assure nuclear reactor safety. The primary role is carried out through the inspection program consisting of onsite resident inspectors as well as special team inspections combining Headquarters and regional personnel. A second significant programmatic component relating to reactor safety is the Systematic Assessment of Licensee Performance whereby components of the licensee's operational performance are evaluated and weaknesses identified for correction. A third role supported by NRR is the semi-annual discussion of plant performance by senior NRC management with closer scrutiny given at more frequent intervals by NRC staff where significant safety concerns have arisen. Finally, an

additional role of NRR is the continuous measurement of performance with respect to existing regulations, and modifications of plant specific requirements when necessary.

The primary policy role of the Office of Nuclear Material Safety and Safeguards with regard to safety activities associated with reactor sites includes the areas of decommissioning, storage of irradiated fuel in independent spent fuel storage facilities, and generic safeguards threat levels.

RESIDENT INSPECTORS

MR. BEVILL: Please describe and justify your position to double the number of resident inspectors.

CHAIRMAN CARR:

NRC is not doubling the number of resident inspectors. We are implementing a program whereby the total number of resident inspectors at a given site will equal the number of reactors at that site plus one. This program, called "N+1", involves modest growth in FY 1991, +5 Resident Inspectors, and is expected to be fully implemented by FY 1992. Full implementation will result in the total complement of resident inspectors increasing by approximately 20% over the period FY 1989 - FY 1992. This increase, however, has been offset by reductions in region-based inspectors in order to obtain better utilization of inspection resources and to provide a pool of technical expertise in plant operations as one of several sources from which to fill supervisory and management ranks in the Commission. Additional resident inspectors on-site increase the likelihood of discovering areas that require corrective actions and enhance NRC's capability to effectively monitor licensee performance.

REACTOR MAINTENANCE

MR. BEVILL: With the virtual elimination of new licensing issues, the NRC is increasing its efforts in the review of operating reactors. Please explain and justify the

Commission's program to establish a rule for reactor maintenance.

CHAIRMAN CARR:

Analyses of operational events have shown a number of instances of nuclear power plant equipment failures that had been caused by inadequate maintenance. NRC examination of nuclear power plant maintenance programs also revealed a wide variation in the effectiveness of maintenance programs. Because inadequate maintenance can contribute to the failure of equipment needed to prevent or mitigate accidents or can be the cause of initiating events, good maintenance is a key factor in achieving a high level of safety in plant operations. The Commission believes that public health and safety can be significantly enhanced by strengthening the effectiveness of maintenance programs throughout the nuclear industry for the lifetime of plants. This was the basis for initiation of rulemaking on maintenance.

The Commission recognizes that the industry and individual licensees have made improvements in their maintenance programs. Indeed, the Commission has seen noticeable progress by the industry over the past 4 years in the area of nuclear power plant maintenance. The Commission also recognizes that the industry is committed to continue to improve maintenance. Nevertheless, NRC maintenance team inspections have confirmed that further improvements are necessary, especially with regard to effective implementation of maintenance programs. In view of the progress made to date, as well as the industry's expressed commitment to continue to improve maintenance, the Commission decided to hold rulemaking in abeyance for an 18-month period (until June 1991) to monitor industry initiatives and progress and, at the end of this period will assess the need, if any, for regulatory action.

MR. BEVILL: With the continued increase in the average availability of nuclear reactors in this country, why is it necessary for the NRC to insert itself in the industries' maintenance programs?

CHAIRMAN CARR:

The Commission believes that good maintenance is a key factor in achieving and maintaining a high level of safety in plant operations throughout the life of a nuclear power plant by helping to ensure that equipment will perform its intended function when required. Because maintenance plays such an important and integral role with plant operations in assuring public safety, the Commission is convinced that continued industry attention and improvement in the maintenance area is needed not only to improve maintenance at some nuclear power plants today, but to ensure performance of effective maintenance at all nuclear power plants in the future.

As I said earlier, the Commission recognizes that the industry and individual licensees have made improvements in their maintenance programs and in plant availability. The Commission has seen noticeable progress by the industry over the past 4 years in the area of nuclear power plant maintenance. The Commission also recognizes that the industry is committed to continue to improve maintenance. Nevertheless, NRC maintenance team inspections have confirmed that further improvements are necessary, especially with regard to effective implementation of maintenance programs. In view of the progress made to date, as well as the industry's expressed commitment to continue to improve maintenance, the Commission decided to hold rulemaking in abeyance for an 18-month period, until June 1991, to monitor industry initiatives and progress and, at the end of this period will assess the need, if any, for regulatory action.

MR. BEVILL: Do all operating licensees have established maintenance programs and, if so, why does the NRC take the position that a rule is necessary for all licensees without regard to safety significance?

CHAIRMAN CARR:

All power reactor licensees have programs for the conduct of maintenance at their facilities. The maintenance team inspections conducted by the NRC reveal that there are areas of weakness in these programs particularly in their implementation. There continue to be equipment problems and plant events related to inadequate maintenance. The NRC rulemaking activities are directed toward maintenance of structures, systems and components that have a significant impact on safe operation of the plant such that they will perform their intended functions when required. The Commission's objective is reasonable assurance of effective maintenance at nuclear power plants. The rulemaking effort which would define an integrated set of maintenance activities and functions was directed toward improvement and sustained effective maintenance over the life of the plants.

The final rule, as proposed, would have established a general framework for the scope of maintenance programs, but would have allowed flexibility for individual licensees to build upon their existing programs to satisfy the Commission requirements. In recognition of industry initiatives, the Commission is holding rulemaking in abeyance for 18 months.

MR. BEVILL: Has recent NRC experience indicated that industrywide maintenance programs are lacking or has experience shown that industry operational safety has improved?

CHAIRMAN CARR:

The NRC experience has shown that maintenance programs have improved over the past 4 years. Operational safety at nuclear power plants has also improved. However, NRC maintenance team inspections have revealed specific areas of weakness in individual utility maintenance programs which can contribute to equipment reliability and plant safety concerns.

MR. BEVILL: If the Commission has experienced inadequate maintenance at some plants, why is it necessary to develop an extensive industrywide rule on maintenance?

CHAIRMAN CARR:

The Commission is convinced that continued industry attention to maintenance is needed not only to improve maintenance at some nuclear power plants today, but to ensure performance of effective maintenance at all nuclear power plants in the future. The Commission's existing regulations and guidance do not clearly define the Commission's expectations with regard to maintenance of nuclear power plants. The Commission has numerous individualized requirements relative to maintenance of certain systems and components in many places throughout the regulations.

As previously noted, maintenance rulemaking would define maintenance requirements in a more integrated fashion and enhance NRC's capability to effect improvements by licensees with inadequate or poorly conducted maintenance.

EMERGENCY PLANNING

MR. BEVILL: Is there any additional legal authority the Commission requires in order to resolve the licensing difficulties presented by state and local governments' refusals to participate in emergency planning?

CHAIRMAN CARR:

We do not believe that the Commission requires additional legal authority in the emergency planning area at this time. We believe that the Commission's 1987 "realism and utility plan rule," affirmed by the U.S. Court of Appeals for the First Circuit in 1988, offer a framework for avoiding the consequences of a state or local government's refusal to develop an off-site emergency plan.

NRC RESOURCES

MR. BEVILL: How are resources allocated between operating reactors and new licenses?

CHAIRMAN CARR:

NRC specifically allocates resources between multiple areas which includes operating reactors and new licenses. Resource allocation for operating reactors is primarily in the areas of reactor inspection and licensing amendment activity. Effort related to new licenses is directed toward standard plants and plant-life-extension review activities. If a split were to be made dividing the total NRR budget into these two categories, one would be Reactor Licensing Application Reviews and Inspections with 123 FTE and $4.6 million in program support and the other category would deal with Operating Reactors with 1,380 FTE and $29.2 million in program support.

NRC CONSOLIDATION

MR. BEVILL: Describe the status of your effort to consolidate your NRC staff at a second White Flint building.

CHAIRMAN CARR:

In July 1989 Montgomery County, Maryland, approved rezoning for the site to permit construction of the second building. The developer then asked the Government to renegotiate the lease/purchase terms of the contract to adjust for increased costs resulting from complying with Montgomery County's conditions attached to the approval, and for the unanticipated delay of two years in obtaining the rezoning approval.

From July 1989 until March 1990, GSA and the developer discussed new lease rates, purchase options, and other issues. We understand from both GSA and the developer that they have agreed on the terms and conditions and are now drafting a lease addendum to incorporate those agreements.

We understand from the developer's attorneys that the developer is planning to be ready to go before the Montgomery County Planning Board for a final site plan review in May of this year. Assuming prompt approval by the Planning Board, excavation for the second building could begin late this summer.

Although GSA and the developer have not established a schedule for completing the second building, we expect construction of the second building to begin late this summer. Full occupancy could occur by mid-1993 if the construction proceeds without significant problems.

INTERVENORS

MR. BEVILL: Describe the difficulties that the NRC has experienced with regard to the prohibition against paying the expenses of intervenors.

CHAIRMAN CARR:

Every NRC Appropriations Act from 1981 to the present has prohibited the NRC from using appropriated funds to pay intervenors in NRC regulatory or adjudicatory proceedings. This prohibition precludes the NRC from paying intervenors attorneys fees for the work performed-in NRC proceedings. BPI v. NRC, 793 F.2d 1366 (D.C. Cir. 1986). The prohibition does not, however, prohibit a Court from awarding Equal Access to Justice Act (EAJA) attorneys fees to a party who prevails in judicial litigation attacking an NRC regulatory or adjudicatory decision. Electrical District No. 1 v. FERC, 813 F.2d 1246 (D.C. Cir. 1987), interpreting a similar appropriations restriction applicable to FERC.

Since the beginning of 1988 the NRC has paid approximately $115,000 in EAJA attorneys fees to four parties who prevailed in court litigation against the Agency.

First, the D.C. Circuit awarded more than $60,000 to the Union of Concerned Scientists (UCS) for its victory in the first challenge to the Commission's backfitting rule, notwithstanding our vigorous argument that UCS was not entitled to any fees. A bitterly divided en banc Court of Appeals refused to disturb the panel's 2-1 decision awarding fees to UCS.

Second, the agency settled a $55,000 EAJA attorneys fee claim by the Sierra Club for $40,000. This claim involved attorneys fees incurred during the Sierra Club's successful Ninth Circuit attack on the Commission's refusal to allow it to litigate in a license amendment proceeding the possibility of a zircaloy fire at the Diablo Canyon spent fuel pools.

Third, the agency reached a $12,000 settlement in August 1989 on an EAJA claim of about $29,500 by Limerick Ecology Action, which challenged the NRC's grant of an operating license of the Limerick Nuclear Power Generating Station. This claim involved attorneys fees and costs incurred during Limerick Ecology Action's successful Third Circuit attack on the Commission's decision against considering severe accident mitigation design alternatives under the National Environmental Policy Act of 1969.

Fourth, the Third Circuit awarded in January 1990 some $3,571.20 in attorneys fees and $166.15 in costs to the legal aid attorney representing the Graterford inmates challenging the operating license granted the Limerick Nuclear Power Generating Station. Petitioner originally asked the Court to award him $26,400 in attorneys fees and $830.73 in litigation costs. The inmates successfully challenged an agency decision that emergency response training to bus drivers must be offered but need not actually be received.

We expect to continue to have to face EAJA attorney fee claims whenever an intervenor successfully attacks an NRC decision in court. Whenever we feel that no fees are warranted under applicable EAJA principles we will strongly advance our position before the court.

NUCLEAR INDUSTRY

MR. MYERS: What effect will the recent decision by the NRC to approve an operating license for the nuclear-fired power plant at Seabrook, New Hampshire have on the U.S. nuclear energy industry?

CHAIRMAN CARR:

We have no information to ascertain what effect the recent NRC decision to approve the full power license for Seabrook will have on the U.S. nuclear energy industry. The NRC, as a regulatory agency assures that each plant is acceptably safe, without regard to the effect that a finding made for a specific plant might have on the policy or decision-making of other plant owners. More information concerning this question might properly be sought from the Department of Energy.

LICENSING REFORM

MR. MYERS: Please update the subcommittee on the rule-making for one-step licensing.

CHAIRMAN CARR:

On May 18, 1989, 10 CFR Part 52, "Early Site Permits, Standard Design Certification, and Combined Licenses for Nuclear Power Reactors" became effective. The combined license procedure described therein provides for a nearly one-step licensing process. In extremely limited circumstances, the rule provides an opportunity for a second hearing prior to plant operation.

NRC CONSOLIDATION

MR. MYERS: What is the status of the Commission's consolidation of its headquarters' employees in Rockville, Maryland. Elaborate on the benefits received from consolidation.

CHAIRMAN CARR:

The NRC completed the first phase of the consolidation in April 1988 with the full occupancy of One White Flint North. The move consolidated 64 percent of the headquarters staff in a single new Federal office building, allowing the NRC to vacate the Matomic Building, in the District of Columbia, and the Willste Building in Silver Spring, Maryland.

A second building adjacent to One White Flint North is planned which will complete the consolidation of the NRC's headquarters staff at one site just south of the Rockville city limits. This second building will house about 1,000 employees including those in the Office of Nuclear Regulatory Research, Office of Analysis and Evaluation of Operational Data, Advisory Committee on Reactor Safeguards, Advisory Committee on Nuclear Waste, Office of Inspector General, adjudicatory bodies, most of the administrative support staff, and various special facilities such as the Emergency Operations Center, Public Document Room, and Computer Center.

Although GSA and the developer have not established a schedule for completing the second building, we expect construction of the second building to begin late this summer. Full occupancy could occur by mid-1993 if the construction proceeds without significant problems.

We have experienced significant benefits from the first phase of the consolidation which put the Commissioners in the same building with most of the program staff. The Office of Regulatory Research is only two blocks away in a separate leased building. This is a tremendous advantage to the Commission and staff. In the past, when we wanted to have a Commission meeting involving the staff - which could be as often as three or four times in a week - the staff would have to travel back and forth between Bethesda or Silver Spring and downtown Washington. Now, we hold these meetings at White Flint where most of us are housed and all that travel time is eliminated. Also, communication between individual Commissioners and staff is facilitated greatly by the consolidation. For example, the Executive Director for Operations with whom I meet on day-to-day management matters has his office on the same floor as mine, instead of halfway across town, so that we can meet easily and frequently.

The benefits of consolidation will be increased further when the second building is available because all our support activities, including the emergency operations center, library, large meeting facilities, and administrative support will be in the single White Flint location and we will no longer have to maintain shuttle services and all the attendant communications and logistical arrangements between our staff in Bethesda and our staff at White Flint.

HIGH-LEVEL WASTE

MR. MYERS: The Administration proposes to continue the funding of NRC activities associated with the Nuclear Waste Policy Act through direct appropriation from the Nuclear Waste Fund. Is the FY91 budget request of $292.8 million for the Nuclear Waste Fund realistic in view of the many hurdles facing the Yucca Mountain project?

CHAIRMAN CARR:

The Administration's fiscal year 1991 budget request of $292.8 million from the Nuclear Waste Fund is for the Department of Energy's civilian radioactive waste management program. In addition, the administration is also requesting $19.6 million from the Fund for the Nuclear Regulatory Commission to fulfill its regulatory responsibilities mandated by the Nuclear Waste Policy Act.

The Nuclear Regulatory Commission's high-level nuclear waste activities have been re-assessed in light of the Department of Energy's recent near-term changes in its civilian radioactive waste management program. As a result of this re-assessment, the Nuclear Regulatory Commission reduced the amount of resources for its high-level nuclear waste program. These reductions are reflected in our budget request. The majority of the Nuclear Regulatory Commission's remaining fiscal year 1991 planned high-level nuclear waste activities are directed at early resolution of potential licensing issues. Also, as required by law, we must provide early technical guidance and conduct pre-licensing consultations with the Department of Energy.

MR. MYERS: Describe the process by which the NRC monitors the high-level nuclear waste being stored on site. What alternatives must be investigated should nuclear waste repository be near completion by the year 2000, which a Department of Energy directive indicates is the time when spent fuel pools nationwide will reach capacity.

CHAIRMAN CARR:

The Nuclear Regulatory Commission has Resident Inspectors present at every commercial nuclear power plant. Resident Inspectors monitor all reactor licensee activities including storage of spent fuel, which will ultimately be disposed of as high-level waste in a repository.

Should a nuclear power plant spent fuel pool reach capacity before the Department of Energy can take the spent fuel for disposal, the reactor licensee under his operating license remains responsible for its storage. Alternatives available to the licensee include storage of spent fuel in other facilities constructed on site outside the existing reactor spent fuel pool, i.e., storage in another pool or a dry storage installation (cask, module or vault) on site; and storage at another reactor site where capacity is available on either an intra-utility or inter-utility basis.

REACTOR PERFORMANCE

MR. MYERS: What is the status of the availability of nuclear reactors in this country as compared to the availability of reactors in foreign nations? Please describe the NRC's expansion of its program for international cooperation in nuclear power safety.

CHAIRMAN CARR:

As previously discussed, the U.S. industry, on the average, is not yet at the level of such countries as Japan and West Germany. The U.S. industry did make significant improvements in availability from 1986 through 1988. Also, the differences between U.S. and Japanese plants and between U.S. and European plants have decreased considerably.

In the period following the 1986 Chernobyl accident, the NRC has expanded selected elements of its international safety cooperation. Most notably, the NRC has increased its reactor safety exchange activities with the USSR, coordinating for the U.S., and participating in ten working groups formed after the signing in 1988 of a U.S.-USSR Memorandum of Cooperation on Civilian Nuclear Reactor Safety. Increased emphasis has also been placed on our bilateral safety cooperation with the Federal Republic of Germany, France and Japan and our participation in selected activities of the International Atomic Energy Agency, the OECD Nuclear Energy Agency, on reactor and nuclear materials safety, radiation protection and waste management.

NRC RESOURCES

MR. MYERS: The Administration's fiscal 1991 budget request for the NRC shows an increase of $23.4 million. Of this amount, $12 million is requested to address safety improvements. What are some of the safety improvements that the Commission will be focusing on in the coming year. Is the amount requested enough to ensure adequate safety needs are met?

CHAIRMAN CARR:

The NRC's fiscal year 1991 budget request is $23.4 million above fiscal year 1990. This includes $12.6 million to improve the safety performance of operating reactors and materials licensees and to be responsive to the nation's future energy needs and industry initiatives.

This $12.6 million increase will allow NRC to establish the criteria for renewing reactor licenses beyond their current 40-year term to ensure that operating license renewal applications can be reviewed on a schedule compatible with industry submittals; to establish licensing criteria and be prepared to respond to both the industry's and the Department of Energy's schedule for submitting advanced standard reactor designs for approval; to reduce the volume and complexity of the technical specifications under which all reactors are required to operate; to resolve, in a timely manner, the technical issues to support regulatory decisions on reactor safety systems and containments for operating plants as well as those for advanced reactor designs to further enhance the protection of the public in the event of a severe accident; to conduct additional inspections of materials licensees, improve the accounting of approximately 200,000 generally licensed nuclear materials devices, begin the review of approximately 18,000 materials and fuel cycle facility licenses terminated since 1965 to ensure that the sites were adequately decontaminated, and initiate financial reviews for non-reactor licenses to ensure compliance with new decommissioning requirements; to develop the regulatory framework for, and review a first-of-a-kind application to construct and operate the nation's first privately owned uranium enrichment facility; and to provide full regulatory support for the implementation of the Low-Level Radioactive Waste Policy Amendments Act. This includes expanded research to assess alternatives to shallow land burial for low-level waste and additional assistance to Agreement States as they proceed with developing and implementing plans to construct low-level waste disposal facilities.

The NRC's fiscal year 1991 budget request is sufficient to ensure that adequate safety needs are met.

OPERATING REACTORS

MR. MYERS: Please update the subcommittee on the Commission's efforts to review operating reactors.

CHAIRMAN CARR:

The Commission uses several major programs through which operating nuclear plants are constantly monitored to assure that the plants are both capable of safe operation and to that they are managed and operated so that the plant performance is consistent with the safety inherent in the design. The major activities include, continuous measurement of performance with respect to existing regulations, and modifications of plant-specific requirements when necessary; a comprehensive, systematic inspection program extending from daily walk-throughs by on-site NRC resident inspectors through periodic team inspections by region and headquarters inspectors who evaluate systems and personnel performance; and the use of plant performance indicators for which operating data is taken and statistically treated to yield performance trends. The trends help to identify potential degradation in equipment or human performance. Also, systematic assessment of licensee performance, an evaluation process conducted for every plant about every 18 months to assess licensee accomplishment and attitudes relative to operating the plant; operational events assessment that includes daily reviews of reported events, analysis of their significance, and the provision of information and directives for licensees to use to improve their own operational safety; and semi-annual reviews by NRC senior managers to consider selected plants and decide what, if any, action should be taken to address concerns. Each plant in the country is reviewed and evaluated from the standpoint of risk significance.

RANCHO SECO DECOMMISSIONING

MR. FAZIO: Describe the most significant lessons learned from the Shippingport project?

CHAIRMAN CARR:

The most significant lessons learned from the Shippingport decommissioning project are: one, full decommissioning of large nuclear power reactors is technically and economically feasible; two, advance planning and strong project management are critical to project success; three, asbestos insulation removal is a major independent work effort which should be completed prior to pipe and equipment removal; four, decommissioning cleanup criteria should be established early, and criteria are needed for the release of materials for unrestricted use; five, trade-offs between decontamination, volume reduction, and burial costs are necessary; and six, significant reductions in projected worker exposures can be realized through good planning and ALARA practices.

The Shippingport decommissioning work effort took 46 months, cost $92 million, incurred 155 man-rem of worker exposure in 1,350,000 manhours, and resulted in the burial of 220,000 cubic feet of radioactive waste. The project was completed six months ahead of schedule and $6 million under budget. Personnel exposures were much lower than initially projected.

MR. FAZIO: How many of these lessons learned could be helpful as Rancho Seco or Shoreham is decommissioned?

CHAIRMAN CARR:

Virtually all of these lessons would be helpful in the decommissioning of either plant.

MR. FAZIO: What technological advancements were made during the decommissioning of Shippingport?

CHAIRMAN CARR:

The major engineering advancement achieved as a result of the Shippingport decommissioning project was that it demonstrated that decommissioning of a fairly large reactor could be accomplished with application of current technology and advanced our knowledge and experience with use of this technology.

Because the Shippingport decommissioning was not a research and development project and because current technology was adequate, development of major technological advancements were not part of the project. Documentation of decommissioning activities at Shippingport is contained in the DOE report, DOE/SSDP/0081, "Final Project Report for the Shippingport Station Decommissioning Project," December 1989.

MR. FAZIO: Has the technology to decommission a plant the size of Rancho Seco been proven?

CHAIRMAN CARR:

Yes. On the basis of the successfully completed decommissioning of the Shippingport Atomic Power Plant, Mr. John J. Schreiber of the U.S. Department of Energy recently concluded in a speech at the 1989 CEC Conference on the Decommissioning of Nuclear Installation in Brussels, Belgium, that "...the technology, equipment and skills exist... to decontaminate and decommission any size power plant...". Based on studies NRC has performed, the staff agrees with this conclusion.

However, the Shippingport reactor pressure vessel was removed, transported, and disposed intact. For a full size power reactor this method is not generally feasible, and the reactor pressure vessel must be segmented prior to removal and shipment. Although this has never been performed, the basic technology exists and has been well proven in a laboratory environment at Pacific Northwest Laboratory.

MR. FAZIO: Would immediate dismantlement of Rancho Seco provide an opportunity for the NRC to develop specific guidelines, rules and regulations to better determine for the nuclear industry the cost of decommissioning?

CHAIRMAN CARR:

The NRC has already established a comprehensive framework of regulations and regulatory guidance for decommissioning funding.

Current NRC cost estimates and funding requirements for decommissioning are based upon a series of detailed generic studies performed by Pacific Northwest Laboratory. They are considered to be reasonable approximations of the range of decommissioning costs. To improve decommissioning cost estimates for large nuclear reactors and help ensure that funding arrangements remain adequate, NRC is sponsoring continued research programs to update and refine existing decommissioning cost estimates.

Dismantlement of Rancho Seco would result in a considerable amount of additional data on decommissioning costs, which may help improve existing cost estimates. For example, sectioning of a used reactor pressure vessel made of thick steel is a process for which there is extensive laboratory experience but no previous real experience. Therefore, reactor vessel sectioning, if performed, could provide additional data for use in either corroborating or sharpening our existing cost estimates for this activity.

MR. FAZIO: Would Rancho Seco's license from the NRC have to be amended if the Department of Energy participated in the dismantlement of the plant?

CHAIRMAN CARR:

The Rancho Seco license would not have to be amended if DOE participated in the form of providing support and technical advice to the Licensee. SMUD has the latitude to contract with DOE and other organizations to perform work in an R&D effort in connection with decommissioning in the plant under the existing operating license. As the licensee for Rancho Seco, SMUD would remain responsible for the provisions in the license during plant dismantlement. The obligation to conform to NRC requirements would remain the responsibility of the Licensee. If the scope of work proposal by SMUD or its contractors conflicts with the license provisions, or if DOE participated in another manner, such as undertaking control and responsibility for assuring radiological safety or taking ownership of the plant, then SMUD would be required to seek amendments to the license before proceeding with the work.

MR. FAZIO: Traditional decommissioning may not recognize the value of reusing certain power plant components, power conditioning equipment and transmission facilities, and instrumentation and control devices. I believe repowering is a viable option for reclaiming such assets. How can the NRC assist the licensee in expediting the decommissioning plan approval in order to pursue repowering options?

CHAIRMAN CARR:

NRC will expedite the review of the Rancho Seco Decommissioning Plan when the plan is received; however, SMUD has not submitted a Decommissioning Plan. The NRC staff has met with the licensee and will continue to meet with the licensee to facilitate the decommissioning process.

MR. FAZIO: Is there a benefit to the NRC and the nuclear safety for SMUD, the nuclear industry, and the DOE to enter into a cost-sharing arrangement to develop dual purpose Fuel Storage/Transportation casks?

CHAIRMAN CARR:

There is presently underway an industry effort to certify a dual purpose fuel storage and transportation cask; it involves the Nuclear Assurance Corporation, Virginia Power Company, and the Spanish agency ENRESA which is responsible for waste disposal in that country. An application to the NRC for certification is expected in mid 1990. The project might benefit from additional support from either SMUD or DOE.

Since dual-purpose casks must meet the same safety standards as single-purpose storage and transport casks, the safety of storing and transporting nuclear materials in dual-purpose and single-purpose casks is essentially the same. However, the use of dual-purpose casks reduces on-site handling operations because there is no need to transfer the spent fuel from a storage cask to transport cask for shipment. This reduction in handling the fuel would minimize the potential for worker exposure and the potential for handling accidents.

MR. FAZIO: What problems does the NRC foresee in taking expeditious action on these requests? Does the NRC recognize the importance of these requests to the ratepayers and the utilities involved?

CHAIRMAN CARR:

The NRC has these requests under active review. Although the NRC foresees no reason not to act expeditiously on these requests, its actions will be based on a thorough review of the potential health and safety impacts from the actions that the licensees have proposed. Although there is reduced risk associated with a plant in defueled status, there remain risks associated with the storage of spent fuel on site ~~and with the~~ residual radioactivity remaining within the reactor facility.

The NRC recognizes the importance of minimizing costs to a licensee's customers and owners. However, reduction of such costs should be accomplished commensurate with assuring the adequate protection of public health and safety and the environment.

ILLINOIS AGREEMENT STATE PETITION

MR. CONTE: On the 10th of January of this year, the State of Illinois filed with the Nuclear Regulatory Commission a request that Illinois be granted regulatory authority over 11-e.(2) material (thorium). That application in its preapproval period was negotiated by State of Illinois staff and NRC staff over a period of 18 months after Governor Thompson signed Illinois' petition on August of 1988.

I was told a year and half ago that processing time, from submittal to filing in the Federal Register, would be 4-5 weeks. On March 6, 1990, two months after Illinois had submitted its request, Illinois' application was not published in the Federal Register. This was after Mr. Denton had indicated to my staff that the filing was "imminent". On March 6, 1990 representatives from the NRC told me the filing would be delayed by two weeks. We learned yesterday that it would be delayed even further, possibly ten days.

I am aware of two letters from Mr. Richard Meserve to Mr. Denton requesting that the NRC slow down the filing of Illinois' petition. We were given assurances by Mr. Denton that you would not accede to his request.

Chairman Carr, how do you now explain the current delay?

CHAIRMAN CARR:

Following submittal of Illinois' request for an amendment to its Agreement in August of 1988, the NRC staff reviewed the draft regulations included in the request and sent comments to the Illinois Department of Nuclear Safety by letter dated August 23, 1989. The delays from August of 1988 to January of 1990 were due to review and discussion of the Illinois draft regulations, which, in some respects, were incomplete. The final version of the Illinois regulations on this matter was submitted to the NRC January 10, 1990. Thus, the January 10, 1990 submittal finally completed the Illinois request. In accordance with the procedures specified in Section 274 of the Atomic Energy Act of 1954, as amended, the staff proceeded with completion of the assessment of the application. This work was given high priority by the staff. The proposed assessment was completed by staff on March 21 and moved to the NRC Offices of General Counsel and Executive Director for Operations where it was given highest priority attention including staff overtime. The assessment will be sent to the Federal Register the week of March 26 for publication.

Our February 23, 1990 response to Mr. Richard A. Meserve made clear that NRC in preparing the assessment followed the procedures specified in Section 274 of the Atomic Energy Act of 1954, as amended. NRC staff handled the request with deliberate speed and with due regard to its responsibilities under the Act.

TUESDAY, MARCH 20, 1990.

POWER MARKETING ADMINISTRATIONS

WITNESSES

J. MICHAEL DAVIS, ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY

ROBERT J. CROSS, ADMINISTRATOR, ALASKA POWER ADMINISTRATION

JAMES J. JURA, ADMINISTRATOR, BONNEVILLE POWER ADMINISTRATION

JOHN A. McALLISTER, JR., ADMINISTRATOR, SOUTHEASTERN POWER ADMINISTRATION

J.M. SHAFER, ADMINISTRATOR SOUTHWESTERN POWER ADMINISTRATION

WILLIAM H. CLAGETT, ADMINISTRATOR, WESTERN AREA POWER ADMINISTRATION

Mr. BEVILL. The committee will come to order.

We are glad to have each of you with us this morning, and Mr. Davis, the Chair recognizes you. Mr. Davis, we are pleased to have you with us again. Your prepared statements, this will apply to each of you, will be made part of the record, and you may summarize.

OPENING STATEMENT

Mr. DAVIS. Thank you, Mr. Chairman, and members of the committee.

I am pleased to be here this morning with the administrators of the Power Marketing Administrations as they present their budget requests for Fiscal Year 1991. I would like to introduce my colleagues, Mr. Robert J. Cross, Administrator of the Alaska Power Administration; Mr. James Jura, Administrator, Bonneville Power Administration; Mr. John A. McAllister, Jr., Administrator of the Southeastern Power Administration; Mr. J. M. Shafer, Administrator of the Southwestern Power Administration; and Mr. William Clagett, Administrator of the Western Area Power Administration.

Each of the administrators will speak to the budget needs of their agency. The President's Fiscal Year 1991 Budget proposes legislation now being finalized in the executive branch which would modify the repayment practices of four of the five power marketing administrations. The PMAs generate and sell six percent of the Nation's electric energy. They are major government businesses with annual power sales of about $2.8 billion dollars. It is appropriate that the PMAs repay the federally financed investment on a regular business-like basis. The President proposes to modify the repayment practices of the PMAs by placing them on a straight-line repayment schedule and adjusting the interest rates on all outstanding investments from the existing original project rates to the current market rates utilities now pay.

Also included are the investments in irrigation features of reclamation projects that are funded from the power receipts of the PMAs. In addition to placing the PMA repayment practices on a more sound footing, these reforms are projected to produce additional federal revenues and therefore reduce the budget deficit by about $966 million dollars in Fiscal Year 1991.

The President's Fiscal Year 1991 Budget also assumes completion of the sale of the Alaska Power Administration and anticipates the sale of the Georgia/Alabama system within the Southeastern Power Administration to existing customer groups.

Mr. Chairman, that completes my testimony. Each of the administrators has a statement on his budget request and will be pleased to answer any questions you may have.

[The prepared statement of Mr. Davis appears at the end of the hearing record.]

Mr. BEVILL. All right. The Chair recognizes Mr. Cross.

ALASKA POWER ADMINISTRATION

Mr. CROSS. Thank you, Mr. Chairman.

Our Fiscal Year 1991 request is providing adequate funds to continue the Alaska Power Administration programs while we are pursuing the divestiture activity. The program level is essentially the same as it has been for the last several years—emphasis on maintenance, a few rather small replacements and improvements, and our activities with the Corps of Engineers towards the completion of the Crater Lake construction activities.

The divestiture is now in the formal interagency review stage, and we expect to have a good bill for Congressional consideration shortly. I want to say thank you for the support of adequate funds that this committee has given for the maintenance activities for the Alaska Power Administration. I think we are seeing the payoff in long-term cost savings to the project and the excellent condition of the facilities themselves.

Mr. Chairman, that completes my testimony. I would be happy to answer any questions.

[The prepared statement of Mr. Cross appears at the end of the hearing record.]

Mr. BEVILL. The Chair recognizes Mr. Jura.

BONNEVILLE POWER ADMINISTRATION

Mr. JURA. Thank you, Mr. Chairman, members of the committee. It is a pleasure to appear before you again.

At the end of last fiscal year, BPA made its planned payment of $606 million to the Treasury in full and on schedule. This brought our total payments of principal and interest on the system's Federal investment to $6.4 billion. We are confident that we will meet our payment obligations in full and on schedule again this September for the seventh year in a row.

In spite of BPA's third consecutive poor water year, we finished Fiscal Year 1989 with net revenues of $40 million. The poor water resulted in our under-recovering $260 million from surplus and non-firm sales, and added costs of $93 million due to off-system power purchases. However, we ended the year in the black with higher than expected Northwest sales due to a healthy aluminum market, a strong regional economy, efficient operation of the transmission system, and strict cost discipline within the agency.

I am pleased to report a very favorable development in BPA's financial picture—the success of our non-Federal debt restructuring program. Thanks to BPA's rate stability and financial strength, as well as the removal of some legal impediments, BPA and the Washington Public Power Supply System have been able to issue nuclear project refunding bonds in the financial market.

Three sales to date have totaled $2.2 billion, with effective interest rates averaging 7.6 percent. This compares with interest rates of 10 to 15 percent on the bonds refunded. We are planning other sales this year as part of an overall refunding program to exceed $3 billion. This program is expected to reduce BPA's total debt service by $70 to $80 million a year.

BPA's revenues continue to be strongly influenced by water conditions and the Pacific Northwest aluminum industry. The world price of aluminum—which drives our variable rate for aluminum smelters—has fallen by one-third over the past year. This causes a marked reduction in our aluminum revenues, although the smelters still operate at nearly full capacity.

Balancing this downward tug on BPA revenues is the favorable water situation. For the first time since 1986, we are experiencing near-normal precipitation and projected runoff. All major reservoirs are expected to refill.

As a consequence, BPA has been able to market substantial amounts of non-firm power during the past month. The resultant revenues—if water conditions remain good this spring—should outweigh the lower income from aluminum customers this year.

Later this year, BPA will begin reviewing its rate schedules for possible adjustments in Fiscal Year 1992. The outcome will be influenced by the necessity to reinforce our transmission system at critical points, and by the evolving need for new resources in the Northwest to meet our customer loads.

BPA is always cognizant of its primary mission—to provide our customers with an adequate, reliable, reasonably priced, and environmentally sound power supply. Our challenge for the 1990s is to fulfill this mission at a time when the growing demand for electricity has absorbed our earlier surplus, and we must acquire additional resources.

BPA's Fiscal Year 1991 budget is a transition budget. It lays the groundwork for an aggressive program of integrating least-cost resources as we move into the 1990s. We expect to return to this committee for advice as our resource planning translates into prudent acquisitions.

This program has a strong emphasis on conservation. From enactment of the Northwest Power Act in 1980, through 1989, BPA has produced nearly 300 average megawatts of energy savings at a cost of $610 million. Another $130 million is committed to support the Model Conservation Standards adopted by the Northwest Power Planning Council. This investment will save another 100 to

400 megawatts over the next 20 years, depending on load growth of the region.

We are working closely with the Council and other regional interests in planning for cost-effective and lost-opportunity resources. Our draft 1990 Resource Program outlines a flexible and environmentally sound plan for responding to a range of possible load growth rates in the 1990s. Least-cost conservation is the backbone of this program.

Mr. Chairman, there are no major new initiatives in our Fiscal Year 1991 budget. Our planned obligations will exceed those of the current year by just 3 percent.

BPA's main goals continue to be: making our annual payment to the Treasury on time and in full; stabilizing revenues; meeting a growing demand for electricity; and holding the line on costs. We believe the Fiscal Year 1991 budget reflects these goals.

Thank you.

[The prepared statement of Mr. Jura appears at the end of the hearing record.]

Mr. BEVILL. Very good. The Chair recognizes you, Mr. McAllister. As we customarily do, this is your first appearance so we will put your biographical sketch in the record. You may proceed as you wish.

SOUTHEASTERN POWER ADMINISTRATION

Mr. MCALLISTER. Thank you, Mr. Chairman.

It's a pleasure for me to make my first appearance before your subcommittee to discuss Southeastern Power Administration's budget.

I will summarize our request and some of our accomplishments. The funding level of $20.3 million dollars is requested in the President's Fiscal Year 1991 budget to continue to effectively carry out Southeastern's mission at the current level. Of this request, approximately $2.6 million dollars is for operation and maintenance activities. The major portion of the budget request, approximately $17.7 million, is for the purchase power and wheeling activity. The use of $11 million dollars of unobligated balances reduces the overall request for new budget authority to only $9.3 million dollars.

During Fiscal Year 1989, contracts were negotiated between Southeastern and most of the preference customers in Georgia, allowing a generation and transmission cooperative and an agency of municipal customers to transmit Southeastern's power to the preference customers. Primarily because of these arrangements, the Fiscal Year 1990 budget request for purchase power and wheeling was reduced from approximately $40 million to $16 million for an overall reduction of $24 million dollars.

In Fiscal Year 1991, an increase of approximately $1.8 million is requested to fund contractual agreements which specify that Southeastern will discontinue selling capacity to the Southern Companies. This capacity will be wheeled by the Southern Companies to the preference customers not located in Georgia. Southeastern will use appropriated funds to pay for these wheeling charges, which formerly were settled through net billing arrangements. Estimated power revenues for fiscal year 1991 are $175 million.

Primarily as a result of continued droughts in the Southeast, repayment schedules for the Georgia-Alabama system accumulated large deficits over the Fiscal Years 1986 through 1989. During Fiscal Year 1989 Southeastern was able to implement a rate increase which had not been anticipated by then-existing contracts. The rate increase was designed to ensure system repayment in a timely manner.

During Fiscal Year 1990, a formal rate presentation will be submitted to the Federal Energy Regulatory Commission for the Georgia-Alabama system rates for the period beginning October 1, 1990. During Fiscal Year 1990, project operations and hydrological conditions are expected to be favorable. The projects in the Georgia-Alabama system have recovered from the prolonged drought of the past several years, and the other three systems have experienced a near-normal or better water year. The need to purchase replacement energy during the year appears improbable.

Mr. Chairman, that concludes my remarks and I look forward to any questions you or any subcommittee members have of me.

[The prepared statement of Mr. McAllister appears at the end of the hearing record.]

SOUTHWESTERN POWER ADMINISTRATION

Mr. BEVILL. The Chair recognizes Mr. Shafer.

Mr. SHAFER. Thank you, Chairman Bevill, Congresswoman Smith. It is a pleasure to appear before you and present Southwestern's Fiscal Year 1991 budget request.

Our budget this year presents our standard program with which this committee is long familiar. The $44 million of requested budget is slightly less than last year's budget and is reduced by about $9 million of reimbursable authority requested and $15 million by available prior year balances.

It provides funds to operate and maintain an aging transmission system and to construct needed replacements and additions and to make power purchases and pay for wheeling that would allow us to meet our contractual obligations.

One of our main objectives is to promote joint and least-cost planning in the area, and to that end we have completed a ten-year needs study that we are sharing with our neighboring utilities in our area. That should result in avoidance of duplication of facilities and also in some environmental and financial savings.

This is the eighth straight year that we have improved our repayment status. The system produced above-average generation this past year, which resulted in revenues of approximately $91 million. We have determined that $22.8 million of this is available for repayment on long-term debt. That makes our total repayment approximately $187 million which is about 21 percent of our $896 million total investment.

We were fortunate this last year in not having to raise rates. However, in 1990 it does appear that we will be asking for a rate increase of approximately 15 percent. We have already initiated meetings with a committee set up by the customers to review with us and the Corps of Engineers the costs that are resulting in the need for this additional revenue.

This past year we reached two significant milestones in our program to facilitate the non-Federal financing of hydro projects. The first milestone was the Robert Douglas Willis project on the Town Bluff Dam in Texas, which was placed into commercial operation in December, 1989. That project is the Nation's first Federally owned and operated project constructed with non-Federal funds.

The second milestone was the signing of contracts with the Corps of Engineers and the Grand River Dam Authority in Oklahoma which provide for the Grand River Dam Authority to finance the construction of two additional units at the Fort Gibson Project.

I am pleased to report that negotiations to improve operations at the Harry S. Truman Project have resulted in an interim operating plan that will provide some additional flexibility and provide for additional testing of that project.

However, considerable work needs to be done in testing of this project before a final decision can be made by the Corps on its full utilization.

We are working to increase our awareness and our customers awareness in the areas of energy efficiency and conservation. We are doing this by working closely with them to develop a more effective program that will provide for better utilization of our regional resources.

In conclusion, I am pleased to say that I have enjoyed this past year as administrator of Southwestern. I'm particularly appreciative of the cooperation and professionalism that I have experienced working with the employees at Southwestern and the Department of Energy and of course the customers of Southwestern. It is our priority to provide our customers with the best available service and at the same time, see that we meet our repayment obligations.

I will be glad to answer any questions that you might have.

[The prepared statement of Mr. Shafer appears at the end of the hearing record.]

WESTERN AREA POWER ADMINISTRATION

Mr. BEVILL. Mr. Clagett?

Mr. CLAGETT. Thank you, Mr. Chairman.

It is my pleasure to present Western Area Power Administration's Fiscal Year 1991 budget request. I would like to mention that the budget represents no new thrusts. It is a continuation of programs and activities that we have performed in the past. We believe that we are adequately funded to carry out our mission in an efficient and effective way.

We tend to mention all of our difficulties, so it is probably a good time to mention some good news. We have a facility called the Sidney Converter Station that was built in Sidney, Nebraska. It was energized just two years ago and in its first two years of operation, when people are normally working out the bugs, we have had better than 98 percent availability. This is an accomplishment and it came at exactly the right time, with the drought, and the increased need to purchase and transfer power from one place to another. During the drought, the facility has been extremely beneficial to us.

I wanted to bring it up at this time, because this is the last time I will be appearing before this committee with Mrs. Smith as a member. It was this committee's efforts with Mrs. Smith as a champion that resulted in that project being built in Sidney.

RENAMING SIDNEY CONVERTER STATION

Mr. BEVILL. Well, I appreciate those remarks, particularly as they relate to Mrs. Smith. I would like to ask you, Mr. Clagett, if you see any reason why the converter station should not be renamed in honor of Mrs. Smith's contributions?

Mr. CLAGETT. No, Mr. Chairman. In view of Mrs. Smith's role in this project, I think it is a wonderful idea.

Mr. BEVILL. Mrs. Smith, you might have some thoughts on this. Every member of this panel is one of your fans. You have done a great job in this Congress, and we have all been anxious to do something for you. Maybe this is it.

Mrs. SMITH. Well, I am astonished and honored and delighted that you would think of naming the Sidney project after me. It has been known as the Sidney Converter Station. Of course, it is true that we did have to go to bat for it in the Senate/House conference back in 1983, but it was the approval of the entire United States Congress and the agreement of the President that made it possible.

You may remember, those fellows over in the Senate wanted to cut it back to $15 million from the $30 million that we had put in. The important thing is that it is a working reality. It is benefiting consumers all over the West.

I well remember, Mr. Clagett, attending the dedication and what a great day that was. I also remember being there when we turned the first shovel and there was nothing but bare ground all around.

I am so happy to have played a role in the construction. I am particularly happy to note that it has been possible to convert power from coal-fired steam plants in this area where we have such a drought, as you pointed out, and where we have had to curtail hydroelectric power. I am just pleased and honored beyond measure at this recommendation.

Mr. BEVILL. Well, we are proud of the great work you have done on this committee. We have already talked about it, and every member of this panel is very supportive of this. We appreciate, especially, your explaining to the Senators over there. [Laughter.]

I don't think they will ever bother any project that you have any more. [Laughter.]

Very good. Everybody is in favor, so that answers your question, doesn't it, Mr. Clagett?

Mr. CLAGETT. Yes, sir.

Mr. BEVILL. You will take it from there?

Mr. CLAGETT. Yes, sir. We will make the arrangements. Thank you very much.

REPAYMENT REFORM

Mr. BEVILL. Very good.

Secretary Davis, would the proposed rate reform require legislation prior to implementation by the Administration?

Mr. **Davis**. Yes, sir, it would. It would require a legislative proposal. The Secretary has testified before this subcommittee that he would not initiate any rate reform without Congressional approval.

Mr. **Bevill**. We ask this question and you make this statement every year. We ask this question and then we take it under advisement, don't we?

Mr. **Davis**. Yes, sir.

Mr. **Bevill**. Then we will take it under advisement again. [Laughter.]

ALASKA DIVESTITURE

Mr. Cross, what issues must be resolved with the interested purchasers and among other Federal agencies before the proposal for the sale of APA will be submitted to Congress?

Mr. **Cross**. Mr. Chairman, we are currently working on some unanticipated fisheries issues with the National Marine Fisheries Service and the Fish and Wildlife Service. That appears to be the principal remaining issue that must be taken care of before the package is ready to send to you.

THIRD AC INTERTIE

Mr. **Bevill**. All right. Mr. Jura, would you describe the current status of the Third AC Intertie system to us, please?

Mr. **Jura**. Yes, sir. Bonneville and our partners in the North, PP&L and PGE are working closely with the TANC organization and WAPA in California to keep this line on schedule. We are moving ahead with it. The line is on schedule. We have amounts in our budget, and WAPA has non-federal reimbursable authority in their budget to continue the project.

SALE OF SEPA ASSETS

Mr. **Bevill**. Mr. McAllister, will the department need legislative authority to study the sale of SEPA assets in the fiscal year 1991?

Mr. **McAllister**. Mr. Chairman, the department is currently drafting legislation to begin the process of divestiture.

SWPA

Mr. **Bevill**. Mr. Shafer, would you describe your efforts to promote financially feasible and environmentally acceptable non-Federal hydroelectric projects?

Mr. **Shafer**. Yes, Mr. Chairman.

Southwestern Power Administration is working to facilitate the development of non-Federally financed hydroelectric projects. We do that by participating with the Corps of Engineers in identifying potential projects, and then making them known to the public so that they can review the proposed projects. If an entity should come forward and propose to develop a project, we then review that proposal from the standpoint of economic feasibility and marketability. If they so choose to proceed, then we assist them in that process.

IMPACT OF DROUGHT

Mr. **Bevill**. Mr. Clagett, the drought in the western United States has impacted local economies. What impact is it having on Western and its customers and how might continued drought conditions affect future year budget requests?

Mr. **Clagett**. Mr. Chairman, the drought's impact on hydroelectric generation is very serious for our system. I understand from discussions with other power marketing administrations that their hydroelectric situation has improved, so they are approaching normalcy. This is not the case for us.

We have considerable reservoir storage on our system. That means it takes longer for us to get into trouble, but once we get into trouble, it takes us longer to get back out. If we have normal water conditions, depending on which system, it will take three to six years to refill the reservoirs. The Missouri River Basin is in the worst shape. It is down to less than 20 million acre feet of active storage or less than 50 percent of normal active storage. It will take up to six years of normal water to refill those reservoirs and get back to normal power production.

Just a few years ago in 1984 when we had good water, we produced and sold about 50 billion kilowatt hours. We expect this year we are going to produce only about 24 billion kilowatt hours and we are going to have to purchase at least 8 billion kilowatt hours to meet our firm power commitments. Those increased purchases cost money. In addition, reduced production reduces non-firm sales so we have a financial crunch. The point is, because of the reservoir storage situation, if we have normal water next year, it will take several years to get out of this situation.

Mr. **Bevill**. Is this a record drought for you?

Mr. **Clagett**. It is getting very close to one. It is a record drought for some of the systems since the reservoirs have been built. There are years on record that are worse, but they go back to before the reservoir system was put together.

Mr. **Bevill**. All right.

Mr. **Clagett**. But not much worse, Mr. Chairman. We are approaching the worst on record.

Mr. **Bevill**. Yes. Where do you get the extra power from?

Mr. **Clagett**. Fortunately, over most of our system, there is surplus coal-fired generation available, so we have been able to purchase power at a reasonable price. We are very pleased that the Sidney and Miles City D.C. ties allow us to purchase power in Nebraska and Kansas and bring it into Colorado and Wyoming. We are pleased that this drought is not five or ten years down the road when most surpluses will probably be gone.

Right now surplus power is readily available at competitive prices.

Mr. **Bevill**. Yes.

The Chair recognizes Mrs. Smith.

Mrs. **Smith**. Thank you, Mr. Chairman. Thank you all for being here. We think you do such a great job. Thank you especially, Mr. Clagett, for your recommendation.

I appreciate hearing your comments about the seriousness of the drought. Believe me, out in western Nebraska where I come from, we have a great concern. We realize, as you say, that this will take a long time getting back to normal.

Now, Mr. Davis, we are so glad to have you here, and we appreciated hearing you say that it will take legislative action before you make a change in the payment structure of the PMAs. I was delighted when I asked Secretary Watkins about this the other day to have his assurance that you will wait for Congressional guidance, but there are one or two points that I did want to ask you about.

Last year, your predecessor, Dr. Berg, told us about the study that OMB had ordered, a study of improved financial management practices. He told us it cost $181 thousand. What beneficial information, if any, did you get from that study and how has it been used?

IMPROVED FINANCIAL MANAGEMENT PRACTICES STUDY

Mr. DAVIS. I would have to provide an answer for the record because I am not personally aware of that study.

Mrs. SMITH. I see. Can you tell us who will ultimately bear the cost of that study?

Mr. DAVIS. Again, ma'am, I am not personally aware of that study, and I will have to respond for the record.

[The information follows:]

FINANCIAL MANAGEMENT PRACTICES STUDY

The Financial Management Practices Study reported on the financial practices of the Power Marketing Administrations identifying the similarities, differences, and the reasons for the differences. The study also compares the PMA rate-making procedures with rate-making procedures of investor-owned utilities and municipal utilities. The study also reviewed the possible use and application of various financial performance indicators. The benefits derived by this study are that it consolidates in one report the reasons for the differences in the Power Marketing Administrations accounting and financial practices enabling one to better understand how, and more importantly, why they are different. Of the financial performance indicators reviewed, the Office of Management and Budget selected four to be submitted as supplemental supporting information for the budget submissions. The financial performance indicators selected for annual submission are the Debt Service Coverage Ratio, the Cumulative Principal Payment as a percent of Total Federal Investment, the Percent Variance of Actual from Planned in Net Available for Repayment, and the Net Cash Flow to the U.S. Treasury.

A 5-year historical record for the four indicators has been incorporated by each of the PMAs in their FY 1991 budget submissions to the Office of Management and Budget.

I would like to provide the transmittal letter and summary of recommendations and conclusions for your information. We would also be happy to provide the two-volume study if the committee wishes it.

The ratepayers will bear the cost of the study. The costs of the study expended by each of the Power Marketing Administrations are considered operating costs, which are incorporated into the rates. Any DOE Headquarters costs were paid from appropriations. The following is a list of the cost of the Financial Management Practices study by PMA.

COST OF FINANCIAL MANAGEMENT PRACTICES STUDY

Power Marketing Administration:	Estimated Amount
Alaska	$ 20,000
Bonneville	76,000
Southeastern	21,000
Southwestern	22,000
Western	42,000
Total	$181,000

THE SECRETARY OF ENERGY
WASHINGTON, D.C.

November 30, 1988

Dear Mr. Wright:

This is in response to the letter dated March 7, 1988, from the Office of Management and Budget (OMB) asking the Department of Energy (DOE) to prepare a study of the financial management practices of the five Power Marketing Administrations (PMAs). The July 8, 1988, Presidential policy guidance letter relating to DOE's fiscal year 1990 budget requested that the study be completed before DOE's budget submittal in September 1988. We provided a draft of this study for review by OMB staff on August 11, 1988. After 6 months of effort and coordination among the PMAs, and with coordination and discussions with the OMB staff, we are now providing you with the enclosed final study.

The study addresses major areas relating to the financial practices of the utility industry and the PMAs. Based on our analyses and evaluation of these topics, we have reached specific recommendations and conclusions. The major areas addressed in the study as well as our recommendations and conclusions are summarized as an enclosure.

We appreciate the opportunity to explain the financial activities of the five PMAs, and to explore potential improvements to existing practices.

Yours truly,

John S. Herrington
John S. Herrington

2 Enclosures

Honorable Joseph R. Wright, Jr.
Director
Office of Management and Budget
Washington, DC 20503

A STUDY OF
POWER MARKETING ADMINISTRATION
SELECTED FINANCIAL MANAGEMENT PRACTICES

Major Areas Studied

1. Prevailing electric utility financial management practices.

2. Overview of the characteristics of each of the five PMAs.

3. The basis for existing PMA financial practices, and specific risk mitigation measures that have been previously adopted by the PMAs to assure timely repayment to the U.S. Treasury.

4. Evaluation of 20 financial performance indicators, including the debt service coverage ratio.

5. Inclusion of construction work in progress (CWIP) in PMA ratemaking.

6. Amortization of power investments assigned to future irrigation projects.

7. Establishment of revolving fund authority for operation, maintenance, emergency, and replacement expenses for the four PMAs other than the Bonneville Power Administration.

Summary of Recommendations and Conclusions

1. The financial performance indicators studied provide different ways of evaluating financial performance. Four of the indicators were determined to provide relevant and useful information for evaluating a PMA's financial performance. These indicators include the debt service coverage ratio, cumulative principal payments as a percent of total Federal investment, percent variance of actual from planned annual principal payments, and net cash flow to the U.S. Treasury.

2. Each PMA should provide an updated 5-year historical record for the four indicators as part of DOE's annual budget.

3. Financial performance indicators are best suited for use as management tools to monitor and track financial performance against internally developed financial plans unique among different utilities. For purposes of PMA ratemaking, it would be inappropriate to use financial performance indicators as mandatory targets. Existing practices used by the PMAs adequately assure timely repayment of the Federal investment.

4. The concept of inclusion of CWIP in PMA ratemaking is not applicable to the PMAs because the PMAs do not establish revenue requirements using a "rate base" approach to ratemaking and because construction scheduled to be in service within the next several years is already included in each PMA's revenue requirements through use of prospective test years. Power system additions already accrue interest during construction prior to the date of commercial operations. This expense is fully repaid to the U.S. Treasury along with actual construction costs.

5. The appropriate amortization period for power facilities assigned to future irrigation development within the Pick-Sloan Missouri Basin Program of the Western Area Power Administration (Western) is addressed in the study. Western recognizes the risk to repayment from delaying amortization of power investments assigned to future irrigation development until the irrigation investment is in place. However, Western believes an alternative repayment approach would require legislation to implement.

6. A revolving fund for operation, maintenance, emergency, and replacement expenses would provide a number of advantages over the annual appropriation process currently used by four of the five PMAs (other than the Bonneville Power Administration). An interagency task group should be established to pursue this promising concept in more detail. The Western Area Power Administration is willing to provide leadership in the establishment of such a task force.

Mrs. SMITH. I see. Well then, maybe you will have to respond to this next question for the record, because I am wondering how much you have spent analyzing and estimating the impacts of the Office of Management and Budget's so called "Repayment Reform" initiative and, ultimately, who will have to bear that cost.

REPAYMENT REFORM

Mr. DAVIS. I am not aware of any expenditures the Department has made in this regard. I will look into this matter, though, and will provide a response for the record.

[The information follows:]

REPAYMENT REFORM INITIATIVE

I have asked the PMA Administrators to provide estimates of how much each Administration spent analyzing and estimating the impact of the FY 1991 Repayment Reform proposal. These operating costs would be recovered from their electric ratepayers. DOE Headquarters costs would have been negligible.

PMAs	*FY 1989 Rate Reform*
Alaska	(No impact due to impending sale)
Bonneville	$70,000
Southeastern	2,480
Southwestern	3,700
Western	10,100
Total	83,380

I am told there is language in the Energy and Water Development Appropriations Act for FY 1990 which prevents the Executive Branch from changing or studying a change, from a cost base to a market base for PMA rates. The Administration's FY 1991 PMA repayment reform proposal is a cost-based approach which, when enacted, would place the repayment practices of the PMAs on a more business-like basis.

The ratepayers will bear the cost of the study. The costs of the study expended by each of the Power Marketing Administrations are considered operating costs, which are incorporated into the rates. Any DOE Headquarters costs were paid from appropriations.

LAKE MC CONAUGHY RELEASES

Mrs. SMITH. Fine. That is just great.

Mr. Clagett, I have one question that really touches on what you were talking about. My information is that releases of water from the Shasta Dam in California for the benefit of the endangered Chinook Salmon have resulted in losses of hydroelectric power that were replaced at considerable cost to the power customers. Now, in Nebraska, similar releases are already occurring at Lake McConaughy mainly to benefit the migratory bird habitat.

What would you suggest as the administrative or legislative options to such releases?

Mr. CLAGETT. I would like to think about that situation and provide something for the record, Mrs. Smith.

Mrs. SMITH. That will be just fine.

Mr. CLAGETT. That certainly is a complicated issue and I think we have to respect the multi-purpose aspects of those projects and certainly the competing interests are getting more intense.

[The information follows:]

BYPASS WATER RELEASES

The cold water bypass release at Shasta Dam could be avoided by the installation of a temperature control device which is estimated to cost about $50 million. Planning and design of a Shasta temperature control device is currently being carried out by the Bureau of Reclamation, the Federal agency that operates Shasta Dam. The installation of the Shasta temperature control device would allow the colder water in Shasta Reservoir to be released through the Powerplant and thereby eliminate the need for releases of cold water that bypass the Powerplant. The Western Area Power Administration, along with the Federal and State of California Fishery agencies, the water and power customers of the Central Valley, and various other interested parties, are participating with Reclamation in its planning process which includes an environmental impact statement. As soon as the planning for the Shasta temperature control device is completed in September 1990, Reclamation plans to seek congressional authorization and appropriations to construct the device. Also, the authorization to construct the Shasta temperature control device is included as one of the features of the "Upper Sacramento River Fisheries Resources Restoration Act" (H.R. 3613) that was introduced during the first session of the 101st Congress, in the House of Representatives by Congressman Douglas H. Bosco and the Senate by Senator Pete Wilson. As for Lake McConaughy, Western is not involved in its ownership or operation. Lake McConaughy is located at the North Platte River in Western Nebraska. It is a state project owned and operated by the Central Nebraska Public Power and Irrigation District with a business office at Holdrege, Nebraska. The releases of water that are made at Lake McConaughy are controlled by the District and are downstream from Western's sources of hydrogeneration.

Mrs. SMITH. Well, it is a complicated issue, and believe me, this member of Congress is getting more and more phone calls and letters every day. You know that they have started lowering the level of the water as of March 8th in Lake McConaughy. At the west end of Lake McConaughy, we have a very important wildlife habitat. We have over a hundred Bald Eagles, and we have large numbers of Sandhill Cranes, and geese and ducks at certain times of the year as well as otter. The people out there feel that this wetland will be dried up in order to provide for another wetland 200 miles down the river.

Also, I am hearing from irrigators and business people in that area and also in central Nebraska who are very much concerned. I think we all need to be thinking about what options are available.

Yesterday, when Mr. Sherman was here, he assured me that they will make a decision within 90 days on the request for a rehearing, but the people out there feel that they really didn't have a voice in this decision.

Mr. CLAGETT. I appreciate that, Mrs. Smith. I am glad I am not in the Army Corps of Engineers' shoes in trying to make those decisions.

Mrs. SMITH. Thank you, thank you very much.

No more questions, Mr. Chairman.

Mr. BEVILL. The Chair recognizes Mr. Fazio.

SHASTA DAM WATER RELEASES

Mr. FAZIO. Thank you, Mr. Chairman.

I want to thank you, Mrs. Smith, for getting into a number of areas that I want to get into, and I appreciate that some of these issues are of more than just regional importance.

I would like to follow up on Mrs. Smith's question. She mentioned the situation on the Sacramento River. The Chinook Salmon is at this point becoming endangered. At least, it is on the threatened list and as a result, a number of cold water releases have been made out of Shasta. I wanted to ask you, Mr. Clagett, if you could tell us what you think the total impact of those releases has been on the power customers.

Mr. CLAGETT. The cost of purchasing replacement power for the water that was released because of the water temperature and bypassed the generators is several million dollars. This is becoming an annual event. Just how many millions of dollars it is, I am sorry, I don't recall the number right now.

[The information follows:]

BUDGET IMPACT OF RELEASES

The total dollar impact of cold water bypass releases at Shasta Powerplant on the purchase power and wheeling budget of the Central Valley Project is $6.2 million. This dollar impact, which has accrued over 3 years, is a result of a revenue reduction of $0.9 million in 1987 and replacement power costs of $3.4 million in 1988 and $1.9 million in 1989.

Mr. FAZIO. I am sure that we can have that for the record. I am more concerned about the rationale for spreading these costs, these foregone power revenues, among project beneficiaries. I think it is clear that we are following action here that is needed, and I am not debating the question of whether we needed to do this. This was in response to a Federal action, the declaration of a threatened species under the Endangered Species Act, but, there are clearly a lot of other parties that are benefiting when we take that kind of concern seriously, and attempt to mitigate it. Obviously, in my view, the Federal Government is responsible for solving the problem and yet, all the additional costs have been passed on to the power customers. I'm wondering if there is not some way in which some degree of Federal interest could be accepted in some other manner than simply charging those particular people who are most in the line of fire, so to speak.

Mr. CLAGETT. Well, I think that is a question that is going to be a long time in the answering, Mr. Fazio, but we continue every year to do what we can to keep the cost to the power customers to a minimum within existing law.

[The information follows:]

Cold Water Releases at Shasta Dam

There is a justifiable basis for spreading the costs of power losses attributable to cold water bypass releases at Shasta Powerplant among other project beneficiaries. Western believes that there is sufficient authority and policy to support an allocation of these among the joint purposes of the Central Valley Project. Western's position has been discussed in various meetings with the U.S. Bureau of Reclamation over the past several years, and by letter dated January 12, 1989. Thus far, Western and Reclamation do not agree on this issue. However, Western and Reclamation have agreed to include a provision in the draft legislation for authorization of the Shasta temperature control device that will allow all costs previously incurred from modified operation of the Central Valley Project for fishery protection to be repaid as a part of the construction cost of the temperature control device. If this provision becomes law, Central Valley Project power costs would be retroactively adjusted to reflect the transfer of these annual costs to project investment, that would then be allocated as joint costs to all project beneficiaries.

BOSCO BILL

Mr. Fazio. Sure. I hope we will take a long look at this. Have you seen the Bosco Bill which attempts to restore the Sacramento fish population by other means?

Mr. Clagett. I'm generally acquainted with it, but not in any detail.

Mr. Fazio. Do you think it, from what you understand, represents a positive alternative to the spilling of the colder water?

Mr. Clagett. In general, yes. That is my impression of it.

Mr. Fazio. At some point will you be looking at it in enough detail to take a position on it? I personally don't know whether it will emerge from this Congress, but it seems to me the kind of solution we ought to be seeking in a regional context.

Mr. Clagett. I think we will be looking at it, but as part of the Administration's review.

Mr. Fazio. Well, I would like to know, and I am sure others would be interested in WAPA's evaluation even if you don't take a position on it. We could maybe interpret—read between the lines—before someone else does take a position on it on your behalf.

Mr. Clagett. Thank you, Mr. Fazio.

REPAYMENT REFORM PROPOSAL

Mr. Fazio. I'm sure you mean that. [Laughter.]

I would like to ask a number of you gentlemen how you feel the Administration's repayment proposal is going to impact power marketing administration rates and rate payers. Perhaps some of the other gentlemen who I haven't had as much input from in recent years like Mr. Jura and Mr. Clagett would like to respond. Mr. Shafer, would you like to comment?

Mr. Shafer. Sure. The repayment reform proposal would impact our wholesale peaking rate by approximately 78 percent.

Mr. Fazio. Mr. McAllister, do you have any feel for what it might do to you?

Mr. McAllister. Mr. Fazio, I would like to answer that for the record.

[The information follows:]

SOUTHEASTERN POWER ADMINISTRATION

The impact of repayment reform on the rates Southeastern charges for the sale of electricity will be a 53.6 percent increase which equates to an increase of 12.056 mills for all systems in 1991.

Mr. FAZIO. Okay. It will be important, I am sure, for the members who are from your region.

Mr. Cross, do you know?

Mr. CROSS. Mr. Fazio, the proposal exempts Alaska Power Administration on the assumption that Alaska would be sold, so it would not be covered.

Mr. FAZIO. Is there any question that that will happen?

Mr. CROSS. I could not predict exactly when the sale would take place.

Mr. FAZIO. Do you want to give us, for the record, whatever impact would occur? It might color some people's views of whether you should be sold or not.

Mr. CROSS. We would be very happy to provide that information for the record.

[The information follows:]

ALASKA POWER ADMINISTRATION

The Administration's repayment reform proposal would increase our existing wholesale rates at the Snettisham Project by 205% and 18% at the Eklutna Project.

Mr. FAZIO. Mr. Jura, do you want to comment on this one? I have some other questions for you, but I thought you might be interested in responding.

Mr. JURA. I will give our estimate of the impact on our wholesale rates. We estimate that if the provisions were enacted, it would have an impact of approximately 32 percent on our wholesale power rates.

RATE REFORM IMPACT ON WAPA

Mr. FAZIO. Mr. Clagett.

Mr. CLAGETT. Somehow I expected that.

Mr. FAZIO. I didn't want you to get away without having your opportunity. [Laughter.]

Mr. CLAGETT. There are a number of ways of measuring the impact, Mr. Fazio. One way is that our wholesale composite rates would increase about 52 percent. However, some of the projects have been repaid, so the increase is zero. That means that there are some big increases to come up with an average of 52 percent.

Mr. FAZIO. Can you tell us, off-hand, what particular customers are going to get these increases of approximately 52 percent?

Mr. CLAGETT. I——

Mr. FAZIO. I've seen revolts break out when we talk about five or ten percent rate increases at the local level, so we are talking about some pretty hefty increases here.

Mr. CLAGETT. Well, for a couple of the larger projects, Colorado River Storage Project and Pick-Sloan project, we are talking wholesale rate increases in the neighborhood of 100 percent or more.

Mr. FAZIO. Doubling the rates?

Mr. CLAGETT. Yes, sir.

Mr. **Fazio**. Is it possible, and any of you who want to comment may do so, that these increases could simply have the opposite effect of reducing power sales rather than increasing power revenues? In effect, Treasury gets less rather than more as a result of the request by OMB to increase these rates?

Do you see a reduction in willingness to pay the rates to where we are going to have a number of people reducing their usage? This may be the intended effect—conservation. But, what do you think the impact upon the Government Treasury is going to be?

Mr. **Clagett**. Well, I think you raised a very good point, Mr. Fazio. I'm not sure. I think there is a matter of opinion involved. Some people do believe that they have alternatives that are much better, and whether or not we would be able to sell that same amount of power is a question.

Our contracts do provide for adjusting the rates, and whatever rate is approved by FERC is the one that applies to the contract. But our customers generally have a ninety day termination notice opportunity any time we change the rates. And we could very well have some unmarketed power for some period of time while we find somebody else who wants it.

Mr. **Fazio**. Anybody else want to comment?

RATE REFORM IMPACTS

Mr. **Shafer**. I guess I would from the standpoint that the potential definitely is there if the rates reach the point that they are at or above the market rate. In portions of our particular area, the rate at this time would be slightly less than the market rates, and in other portions it would be higher, so it could eventually get to that point.

Mr. **Fazio**. Anybody else want to offer a guess as to what might occur?

Mr. **Jura**. Well, in our case, Mr. Fazio, we sell all of our product. It is just a matter of what price. We have a customer class, our aluminum customers who make up about one third of our revenues. Depending on aluminum prices at any given time, these customers could be impacted in a way so that we may lose a substantial amount of revenues if they lower production.

The studies we have run have shown that. Then that product would be sold to someone else. If we didn't sell it in the region, it would probably be sold to California.

Mr. **Fazio**. How competitive are those aluminum companies in the world market today, and what impact do you think the rate increases would have on them in terms of their ability to compete and provide jobs?

Mr. **Jura**. It depends on who you listen to. If you listen to them——

Mr. **Fazio**. I want to hear from an objective individual like yourself. [Laughter.]

Mr. **Jura**. We follow the aluminum markets very carefully and we follow world production very carefully to work with our aluminum producing customers to help them become competitive. When we put them on a variable rate, that was the purpose, to help them achieve certainty so they could become competitive.

The aluminum smelters that are located in the Northwest are old plants built during the second world war, so their being competitive has been a major issue with us. Depending upon the magnitude of the rate increase, there is no question that it would knock some of that production off line.

CALIFORNIA-OREGON TRANSMISSION PROJECT

Mr. FAZIO. Thank you all. I wanted to get to this question of the California-Oregon transmission project which the Chairman has already spoken to.

Mr. Clagett, would you indicate where WAPA stands at this moment and how you think things are proceeding in all areas that are important, particularly bids, construction, etc? Could you give us kind of an update on the status?

Mr. CLAGETT. That question sounds like I need about a 20 page report to answer.

Mr. FAZIO. You probably have one. [Laughter.]

Mr. CLAGETT. Yes, we probably do.

Let me start with Western Area Power Administration's situation. We are doing everything we can to meet the schedule. There have been some shifts, but regardless of those shifts, we believe the arrangements we have with TANC provide the opportunity for us to meet whatever schedule is necessary.

We have some specifications out on the street to acquire some construction material. It will be a few months until we can award that contract, and we expect to issue additional specifications in the near future. The arrangements with TANC are such that we expect to award those contracts and start buying material in just a few months.

Mr. FAZIO. Do we have all the resources that we need available, both from the appropriations process as well as from TANC, to keep making the progress we need to make to stay on schedule?

Mr. CLAGETT. I understand that TANC voted to proceed with the project with or without the investor-owned utilities. The uncertainty that seems to be slowing the project down right now is whether or not the California investor-owned utilities can obtain the permits that they need, but even without the permits, TANC has voted to go ahead with or without the investor-owned utilities. I think there are four cities so far and then another one met last night, who have voted to go ahead and those four cities represent 53 percent of the funding. Each of those cities have to vote to assure their participation and the last of those votes is something like April 3, so we will soon know if there is enough participation to proceed.

Mr. FAZIO. Is it your understanding from TANC that even if the investor-owned utilities don't participate, there is plenty of desire to take the remaining portions of the 1,600 megawatt line, both from WAPA and from other participants in the TANC consortium?

Mr. CLAGETT. My understanding is, not only the desire for the 1,600 megawatts but it could be over-subscribed.

Mr. FAZIO. Yes. What, in your view, is the position of the investor-owned utilities? What is the reason why there has been some concern about their participation ultimately?

Mr. **Clagett**. Well, the inability, that they have had in getting their California PUC permits is what has delayed the project and their ability to make commitments. We understand that they have agreed to sign an interconnection agreement for the connection at Tesla Substation that is necessary, and they have indicated a willingness to proceed with some kind of operating agreement.

Mr. **Fazio**. Is it your understanding that PG&E not only has made some agreement at Tesla, but is inclined to operate or integrate the COTP with existing intertie? And, what steps would you take to make sure that kind of coordination takes place?

Mr. **Clagett**. Well, Mr. Fazio, we are a participant in this with TANC and several other organizations, and our posture is to follow the direction given by Congress just a few years ago, and that is to participate and encourage or do whatever we should reasonably do to get this line built.

Mr. **Fazio**. So you are strongly supportive and comfortable with the assumption that this Memorandum of Understanding is going to come together with all the parties who began several years ago.

Mr. **Clagett**. I expect the line will be built.

Mr. **Fazio**. Do you think we can get started on schedule? Will construction be completed in 1992?

Mr. **Clagett**. Well, I'm not sure we are not going to make 1992. There are some people who are saying that the date will be now sometime in 1993, but——

Mr. **Fazio**. We could live with a couple of months.

Mr. **Clagett**. Yes.

Mr. **Fazio**. I wanted to ask Mr. Jura some questions along these lines, too. I know you indicated your positive support to the Chairman. Have you taken all the actions that are necessary to keep the California-Oregon project on schedule?

Mr. **Jura**. Yes, sir.

BPA BORROWING AUTHORITY FOR THIRD AC INTERTIE

Mr. **Fazio**. Do you think that the President's budget provides the amounts that are sufficient in terms of borrowing authority, etc., to be in a position to keep on schedule?

Mr. **Jura**. There is some question given the change in the Fiscal Year 1991 budget as to whether we will be in a position to keep it on schedule.

Mr. **Fazio**. Do you think the committee could be of some help in this regard if we were to provide you with the authority to borrow that would be necessary to stay on schedule?

Mr. **Jura**. The amounts that are included in the budget that give us the authority to borrow may not allow us to keep on schedule.

Mr. **Fazio**. I appreciate your diplomatic response.

I wonder if you could tell us how you view the California industry, the investor-owned utilities, and how they may in your view be creating some concern on the part of Bonneville and its customers as to how quickly we can proceed to meet our schedule and bring the line into existence.

Mr. **Jura**. I would be happy to answer that, and also make a general statement on the line. Bonneville continues, and I think the Administration continues, to be very supportive of this line. There is no question that this line coming in will enhance the capability of the entire West Coast to make better use of its existing generation resources, and possibly even going up into Canada. There are tremendous environmental benefits associated with that as well as economic benefits that go up and down those regions, so we feel very strongly that this line is beneficial. Bonneville has been very impressed with the determination that we have seen from the public utilities and the TANC organization to keep this line on schedule and WAPA's participation as well. We feel very good about that. It is very clear to us that they are going to proceed no matter what.

It is also clear to us that investor-owned utilities in California are having some difficulty getting appropriate assurances that they need from their PUC commissions, as Bill mentioned. We are hopeful that this action will take place soon and that they will be allowed to join on the project.

There is also no question in our mind that some of the investor-owned utilities feel very strongly about the project and want to be a part of it and are very supportive of it.

The difficulties Mr. Clagett mentioned on interconnection agreements and other assurances we need in place in California are something we are working through, both with WAPA and other partners in the south. We feel very good about the dialogue we have had over the last six months or over the last year on these issues. We have a very good understanding of the situation and we think the California partners have a good understanding of how we are working with our Northern partners, PGE and PP&L.

We have indicated to them the assurances we think we need in order to proceed. They have understood that and we believe that it will be there.

Mr. FAZIO. Well, I am rather optimistic and I know a lot of other people are. The PUC Tesla problem has been worked through, so that no later than the end of this year or early next year we will have approval and can proceed. I am confident that PG&E and Southern California Edison will be part of it, but I also agree with you that it will happen either with or without them.

Do you have anything you want to tell the committee about the way in which you are proceeding to establish a mechanism to allow non-Federal participation in the Third AC in your territory?

Mr. JURA. As I reported to the committee last year, Bonneville has initiated a process to allow for non-Federal participation in 725 megawatts of capacity. We are currently involved in a rates proceeding where we are discussing, and have out on the table a pricing methodology as to how the costs should be assigned for that participation. It is a process that we expect to have completed by this summer. We will then take the methodology from that process, and forward it to FERC for their approval. The methodology will determine the cost of participation in the Third AC.

I feel good about the process. It is going well. We have a number of different opinions within the Northwest, and I suspect within California, as to what those costs should be. We will make the right decision and that decision will stand the test.

Mr. FAZIO. Well, I want to thank you for your very positive approach on this and so many other issues. I think the relationships between California and the Northwest have never been better. I give Mr. Clagett ample credit in helping in that regard as well as a lot of other people.

I am very optimistic that we are going to have something of great economic benefit as you have indicated to both regions. In fact, Mr. Clagett's remarks to the Chairman regarding the drought are a good indication of how much we benefit by having this intertie capacity to knit together our national electric grid. I'm seeing Mr. Davis shaking his head. I understand the Administration's new energy policy is going to be very positive on this score. I think this is to be commended because for the last eight or nine years it has been rather ambivalent or hostile. I think it is important to see the kind of policy which the Administration is about to get behind enunciated, because it really is in the National interest, not just in the regional interest, that we can move power wherever it is needed at any point either in an emergency or in general. I am very pleased that the committee has been helpful in making this situation come about.

I want to thank the Chairman and the other members of the committee for their assistance in the past, and I want to thank them for giving me a little extra time at this point.

Mr. Davis, do you want to comment on this matter for the Administration?

NATIONAL ENERGY STRATEGY

Mr. **Davis**. Mr. Fazio, as you have pointed out, the transmission of electrical power as well as access to transmission services are vitally important issues. There is great concern about it. There is great interest in how those issues get analyzed and resolved. The Department, at the direction of the Administration, is taking some of these issues on. I wouldn't suggest that we have all of the answers, but as we proceed through the analysis of what we have heard from substantial public testimony in the National Energy Strategy development process, hopefully, we will get closer to some of those issues, because they are important and they need to be addressed in a timely fashion.

Mr. **Fazio**. Thank you, and thank you, Mr. Chairman.

Mr. **Bevill**. The Chair recognizes Mrs. Boggs.

Mrs. **Boggs**. Thank you, Mr. Chairman. I apologize to all of you for not being able to be here earlier. I have conflicting hearings this morning and hoped I would get to this one in a timely fashion. Since I didn't, I am not going to delay the rest of you.

I am very hopeful that we can adopt a national energy policy that will make the kind of work that you are engaged in into a national network that will take care of difficulties that we experienced in 1973, and again in 1978. It has taken the country a very long time to overcome the dislocation of the economy that occurred then aside from all of the human elements that were affected. So I thank you for the work that you do. And Mr. Davis, I know we will be working with you very closely, and I am sorry that I was not here for the rest of your testimony. I will read it with great interest.

Mr. **Bevill**. Are there any another questions?

[No response.]

Mr. **Bevill**. Mr. Dicks?

Mr. **Dicks**. I want to welcome all of you and particularly Jim Jura, who has been our outstanding Bonneville Power Administrator. He has been outstanding because he follows and works very closely with the congressional delegation from the Pacific Northwest which we appreciate.

I understand that Bonneville is currently involved in a hearing process with regard to how to handle the issue of access on the Third AC. How does this process work, and how do you think things are proceeding?

THIRD AC INTERTIE

Mr. **Jura**. The process to which you refer, Mr. Dicks, is what we call our 7(i) rates process, which is determining the methodology that will be used to determine the cost we will charge to utilities who would like to participate in the new capacity of the Third AC line.

We are currently involved in this process where we put out an initial proposal. We have taken testimony and public comment on that. We have been reviewing that comment and in our rebuttal testimony Bonneville's position has changed slightly. The price that we have talked about charging for this participation has moved downward. That makes some of the participants happy. It makes others unhappy. We have reviewed all the comments on the price and we think it is the right thing to do to lower it and we have justified that in our testimony.

We are still taking comments, on participation and analyzing this. We expect to finish this process by this summer. By that time we will forward our methodology to FERC for approval and then move on to other things associated with non-Federal participation such as the environmental evaluation that will be necessary.

Mr. **Dicks**. I realize that you and your staff are reviewing the proposal by the Office of Management and Budget that calls for an ownership option on the Third AC. Will the review of the OMB proposal cause any delays in the present schedule for the Third AC?

Mr. **Jura**. We don't think so. The discussion to which you refer is discussion associated with opening up yet another approach to non-Federal participation that we had ruled out earlier. We have been asked to take another look at that. We have agreed to do that. We will conduct that process through our EIS process, which we think will get started in a month or two. At this time we don't see it affecting the schedule of the line.

Mr. **Dicks**. The President's budget reduces the BPA borrowing authority for conservation investments and assumes that more monies will be expensed to compensate for the reduction in borrowing authority. What would such a shift do to the rate base for Bonneville?

BPA CONSERVATION PROGRAM

Mr. **Jura**. This change would move more of our conservation expenditures into expense out of capitalization, and that will put more of a burden on our current rate payers and require us to have a higher revenue requirement in these years.

Mr. DICKS. As I recall, the regional Act, I think, viewed conservation as more of a long-term investment which would lead one to believe that it should be capitalized. Do you recall that in the regional Act?

Mr. JURA. Yes, sir. That was a very main point of the regional Act. The Congress directed us in the Act to treat conservation as a resource, and to give it a priority as a resource. We have done that. We have been operating under that Act for 10 years and in this time period we have slowly moved from capitalizing much of our conservation expenditures to more expensing, but up until last year we were about 50/50. The recent budget would move us more in the direction of expensing and putting, as I said earlier, more burden on the current rate payers of the agency as opposed to capitalizing those expenditures over a longer period.

Mr. DICKS. It certainly is my impression, and I was involved when the regional Act was put forward, that we did not want conservation to be undermined in a sense. It seems to me that is what you are doing with this. What OMB is asking you to do weakens the case for conservation, and so I would hope that you would take that into account.

Now, this is not how you would handle a generating plant, right? You would be able to capitalize a generating facility?

Mr. JURA. Yes, sir.

Mr. DICKS. Okay. In recent years funding for fish bypass facilities has been a problem. In the President's request, the Army Corps of Engineers has expressed concern because they have had difficulty with capital financing, however, the President's fiscal year 1991 budget contains $16 million in proposed funding for fish bypass facilities. Does BPA support that request?

FISH BYPASS FACILITIES

Mr. JURA. Yes, we do. We are very supportive of the action that the Corps of Engineers and OMB has taken including these amounts in the budget.

Mr. DICKS. Isn't it true that electric power pays for most of the bypass hardware and operations?

Mr. JURA. Yes, it is.

Mr. DICKS. Have you planned for the necessary revenues to repay these costs?

Mr. JURA. Yes, sir.

Mr. DICKS. Do you have any concerns with working out the arrangements for the implementation of the fish bypass program with other key regional players such as the Public Power Council, the Army Corps of Engineers, or the State and Federal agencies responsible for protecting fish?

Mr. JURA. No. In fact, I think that one of the major accomplishments that we have had in the Northwest as a result of the regional Act and other things is the cohesion of different interests we have brought to the fish issue, and there is a lot of support for this in the region now.

STAFFING AT BPA

Mr. DICKS. I have a couple questions I would ask of you in one final area. I noticed that your staff strength is cut by 100 people this year in the budget request followed by another reduction of 100 next year. As I recall, because of concerns about BPA's rates, you have already made some rather substantial personnel reductions over the last 3 years in order to keep your costs down. Isn't that correct?

Mr. JURA. Yes, that is true. Bonneville put in a major reorganization 3 years ago that called for a fairly sharp decline in the number of positions we have in the agency. We have, on our own, had a declining staff. We have taken roughly 300 positions out of the agency over the last 5 to 6 years.

Mr. DICKS. What worries me is that as somebody who knows that you have held down on personnel, if you make these additional cuts, it could cause considerable difficulties in your operations. As the manager, aren't you concerned about that?

Mr. JURA. Yes, and with Federal agencies it is very difficult when you go to lay off in a Reduction In Force situation, because of the broad impact it has on your organization. Generally, as a rule my administrative people tell me that for every one person that goes out the door, you impact three or four other jobs within the agency, so there is a fair amount of turmoil associated with a RIF. At the current time we have imposed a hiring freeze. We haven't hired anyone in the agency. We are coming down through attrition, but we will not be able to reach these levels without layoffs. We are working with the Department on that, and with OMB right now.

Mr. DICKS. Thank you, Mr. Chairman.

Mr. FAZIO. Mr. Chairman, could I have one more question?

Mr. BEVILL. Yes, Mr. Fazio.

STAFF REDUCTION AT WESTERN

Mr. FAZIO. Thank you.

I noticed that WAPA has a reduction of 83 people in their budget. I don't have the data in your statement for the outyears. Could you tell me what outyear reductions might be in store?

Mr. CLAGETT. Well, I have to echo a lot of what Mr. Jura said. Attrition will not be sufficient to meet that goal, so the only way that we will make it is to have a reduction-in-force or something like that. I want to emphasize something Mr. Jura also said, and that is that we are having discussions with OMB and the Department to work this thing out.

Mr. FAZIO. Are you requesting early retirement for these individuals?

Mr. CLAGETT. No.

Mr. FAZIO. Would it help if you had it?

Mr. JURA. Yes, if we continue to go down that path, it is very helpful. When we put our reorganization plan into effect three years ago, Bonneville did seek and get approval from OPM for early retirement authority and that helped a great deal, however, going down by these numbers is very disruptive.

Mr. Fazio. Well, obviously, we would like to give you the tools to make it as easy as possible, but in the long run I am not convinced that there is justification for these kinds of cuts. What is the reason why you can take these reductions? Is there anything other than from OMB? I mean there has to be a rationale. I couldn't find it, quickly looking through.

Mr. Clagett. Well, there is a mandate from OMB for the reduction, but the work still has to be done and that means that we contract out more.

Mr. Fazio. So, in other words, we are not really saving any money. We are going to pay people on contract probably more money because they are not limited by Federal salaries.

Mr. Clagett. That is correct.

Mr. Fazio. So I guess without putting words in your mouth, both of you may see this as counterproductive.

Mr. Jura. The work is still there, as Mr. Clagett says.

THIRD AC TRANSMISSION LINE

Mr. Dicks. Since Mr. Clagett is such an expert and has such a knowledgeable background and is really a resource unto himself and to all of us, how are we doing on the other end of the Third AC down in California?

Mr. Clagett. Well, we think we are doing very well. Certainly with the actions of TANC, our efforts, and the public utilities votes to proceed with the project with or without the investor-owned utilities, I think we have to come to the conclusion that the transmission line is going to be built. The question right now has to be whether or not the investor-owned utilities will obtain the permits necessary to participate.

Mr. Dicks. Are they in favor of this project?

Mr. Clagett. Well, everything they say——

Mr. Dicks. We hear about press releases, but are they in favor of it or are they opposing it?

Mr. Clagett. I prefer not to answer——

[Laughter.]

Mr. Dicks. I know you prefer not to, but we didn't invite you here to prefer. Are they for it or against it?

Mr. Clagett. It appears to take a little longer than it should to get some of these agreements written, but they seem to be doing the things necessary for the transmission line to get built.

Mr. Dicks. There is a suspicion up in our part of the world that the leading entity down there is opposed to this, and they have a self interest in opposing it. Now is that the case, or are all these delays real?

Mr. Clagett. There is a suspicion like that in California by others, but I point out that they have filed with the CPUC on two occasions, they have gone to the State Supreme Court, and they have made efforts to get their permits, and they do continue to negotiate on the various issues that are necessary.

Mr. Dicks. Okay, thank you.

Mr. Fazio. If you had been here earlier, Mr. Dicks, I am sure that all of your concerns would have been completely relieved. [Laughter.]

Thank you both.

Mr. **Bevill**. Okay. Each of us will have questions that we will submit for you to answer on the record. I thank each of you for your fine testimony. The committee will stand adjourned now until 10:00 a.m. tomorrow.

[The prepared statements and the following questions and answers were provided for inclusion in the hearing record.]

RATE REFORM

Mr. Bevill. Please describe the rate reform proposal contained in the budget.

Mr. Davis. The rate reform proposal contained in the budget would require the power marketing administrations, except the Alaska Power Administration which is proposed to be sold, to schedule repayment of the unpaid balance of their Federal appropriated investment, including irrigation assistance, on a fixed, straight-line amortization schedule. This contrasts with the "flexible" approach now used, which allows PMAs to pay highest interest debt first so long as the principal is repaid by the end of the required time period, not to exceed 50 years. The repayment reform proposal would also establish a new policy that the unpaid balance of the Federal appropriated investments of the Bureau of Reclamation, the Corps of Engineers, and the PMA transmission projects, including irrigation assistance, would accrue interest at a current market interest rate. Currently, most of these investments, even though they have been undertaken in the past 30 years, accrue interest based on an interest rate that prevailed at the time the initial projects were authorized. Irrigation investments assigned to power for repayment presently bear no interest.

Mr. Bevill. Why is rate reform being proposed?

Mr. Davis. Rate reform is being proposed in order to place the repayment practices of the power marketing administrations on a more business-like basis and eliminate below current market interest rates and the resulting costs to the U.S. Treasury and taxpayers. It will establish a plan for retiring the unpaid Federal appropriated investment on a regular schedule, an element that is absent under current repayment practices.

IMPACT OF RATE REFORM

Mr. Bevill. What will be the impact of rate reform on the rates the PMAs charge for the sale of electricity?

Mr. Davis. I will ask each Administrator to respond on the impact for their respective organization.

Mr. Cross. If applied to APA, the Administration's rate reform proposal would increase existing wholesale rates at the Eklutna Project by 18 percent and at the Snettisham Project by 205 percent.

Mr. Jura. BPA's Priority Firm wholesale power average rate would be expected to increase about 32 percent to 3.1 cents per kilowatthour, from 2.42 cents per kilowatthour average for FY 1991 and FY 1992.

Mr. McAllister. The impact of rate reform on the sale of electricity in the four systems of the Southeastern Power Administration ranges from a high of 60.8 percent to a low of 19.6 percent for an average of 53.6 percent increase, which equates to an increase of 1.2 cents per kilowatthour for all systems in FY 1991.

Mr. Shafer. The impact of rate reform, as currently proposed, on Southwestern's wholesale rates will be a 78 percent rate increase in FY 1991. The 78 percent rate increase would result in raising the peaking rate from 2.76 cents per kilowatthour to 4.91 cents per kilowatthour.

Mr. Clagett. The impact of rate reform on WAPA's wholesale rates varies from no impact for the Boulder Canyon and Parker-Davis Projects to a high of 210 percent for the Washoe Project. However, the weighted Western-wide average wholesale rate increase is approximately 52 percent, or to 2.15 cents per kilowatthour from 1.41 cents per kilowatthour.

Mr. Bevill. What would be the impact on consumers?

Mr. Davis. I will ask each Administrator to respond for their respective agency.

Mr. Cross. The impact on consumers at the Eklutna Project would be minimal. However, at Snettisham the impact would be an increase of approximately 80 percent, to 12 cents per kilowatthour from 7 cents per kilowatthour.

Mr. Jura. BPA estimates that the retail rates of its full requirements customers would most likely increase about 18 percent, from 4.77 cents per kilowatthour to 5.65 cents per kilowatthour. BPA preference utility customers that receive less than their full load from BPA would probably not be required to raise their retail rates as much, depending on the proportion of their loads that are satisfied by BPA.

The residential and small farm consumers of investor-owned utilities receiving the residential exchange benefit would experience somewhat smaller percentage increases as retail consumers of BPA full requirements preference utilities. For other than consumers of full requirements preference utilities, the retail rate impact would be lower, and would need to be calculated on a case-by-case basis. BPA's variable rate to direct service industries, primarily aluminum plants, would most likely increase about 31 percent to 3.02 cents per kilowatthour.

Mr. McAllister. The impact on consumers for Southeastern Power Administration in FY 1991 will be an increase of .07 cents per kilowatthour, which is an increase of 1.2 percent to 6.05 cents per kilowatthour from 5.98 cents per kilowatthour.

Mr. Shafer. For Southwestern, the amount of increase depends on whether the customer is served directly or indirectly from Southwestern's transmission system, and on the percentage mix of the Federal power to the non-Federal power. The customers served directly would experience an increase in retail rates of about 6 percent to 7.24 cents per kilowatthour from 6.85 cents per kilowatthour. The customers served indirectly, nearly one-half of Southwestern's customers (particularly those in Kansas and Louisiana) must pay additional wheeling charges through one to four intervening utility systems to receive Southwestern's power. Current delivered cost with these charges already approaches market levels. The new policies, combined with these wheeling charges, would incur a 2 percent increase to 8.47 cents per kilowatthour from 8.32 cents per kilowatthour. The percentage range of increase at the retail level by customer groups is as follows: municipal customers, 1 to 21 percent; and cooperatives, 1 to 6 percent.

Mr. Clagett. The weighted average increase in rates for customers served by utilities who purchase from Western is approximately 8 percent, or to 5.8 cents per kilowatthour from 5.4 cents per kilowatthour.

RATE REFORM LEGISLATION

Mr. Bevill. Would the proposed rate reform require legislation prior to implementation by the Administration?

Mr. Davis. Generally we believe not, because most project interest rates, repayment periods, and other financial details are not limited by statute. However, there are a few projects with statutorily established interest rates and repayment terms. Legislation would be required to change interest and repayment terms for these projects. However, it is the Administration's intent to submit a legislative proposal to achieve repayment reform.

Mr. Bevill. Has the Department submitted rate reform legislation to Congress yet? If not, when will the proposed legislation be submitted?

Mr. Davis. No, at this time a proposed legislative package has been prepared by the Department of Energy and submitted to OMB for clearance and interagency review.

RATE REFORM REVENUES

Mr. Bevill. What are the incremental revenues expected for all of the PMAs during FY 1991 for rate reform or possible sale?

Mr. Davis. Mr. Bevill, I will let each of the Administrators address their anticipated revenues for FY 1991 due to rate reform and any planned divestitures.

Mr. Cross. The Alaska Power Administration has estimated $85 million for the sale of the Snettisham and Eklutna projects. APA is exempt from the current proposal for the FY 1991 rate reform.

Mr. Jura. BPA estimates that it would need to recover an additional $590.4 million for FY 1991 interest and amortization payments to the U.S. Treasury as a result of rate reform.

Mr. McAllister. Southeastern Power Administration will have an incremental revenue increase in FY 1991 of $87 million due to rate reform and $1.2 billion for the sale of the Georgia-Alabama System.

Mr. Shafer. The incremental revenue projected for Southwestern in FY 1991 is $64 million. No sale of Southwestern assets is considered for FY 1991.

Mr. Clagett. The Western Area Power Administration anticipates an increase in FY 1991 revenues of $226.6 million as a result of rate reform. No sale of Western assets is assumed for FY 1991.

POWER MARKETING ADMINISTRATION SALE

Mr. Bevill. Is the sale of any PMA being proposed as part of the FY 1991 budget? If so, which ones and what is the status of the proposal?

Mr. Davis. There are no sales anticipated for Bonneville, Southwestern, or Western. I will let the Administrators of the Alaska Power Administration and Southeastern Power Administration address their sales individually.

Mr. Cross. The FY 1991 budget proposes completion of the sale of Alaska Power Administration. Currently, proposed legislation to authorize the sale is under review within the Administration. We expect the proposal to be ready for congressional consideration shortly.

Mr. McAllister. Southeastern Power Administration has proposed to sell the marketing rights of the Georgia-Alabama System to the preference customers in the Georgia-Alabama System. A preliminary estimate is $1.2 billion.

FISCAL YEAR 1991 BUDGET

Mr. Bevill. Does the FY 1991 budget request contain sufficient funds for each PMA to discharge its responsibilities for the entire year?

Mr. Davis. Mr. Bevill, I will let each of the Administrators address this question.

Mr. Cross. It provides adequate funding for all of Alaska Power Administration's operation, maintenance, and power marketing responsibilities.

Mr. Jura. Yes, the FY 1991 budget request assumes sufficient funds will be available from BPA borrowing authority, revenues and other non-Federal sources for BPA to discharge its responsibilities for the entire year. The budget assumes that $25.2 million of BPA's planned FY 1991 investments in energy conservation, which were previously planned to be capitalized and financed by the sale of bonds to the U.S. Treasury, will be expensed and financed by BPA operating revenues. The FY 1991 budget also assumes that payments of $45.2 million of the FY 1991 BPA cost of the Third AC Intertie, will be available from potential non-Federal participants to finance the present construction schedule.

Mr. McAllister. Yes, the FY 1991 funding level contains adequate funds for an average year.

Mr. Shafer. Yes, the requested funding level for FY 1991 is sufficient to meet Southwestern's financial needs.

Mr. Clagett. Western's FY 1991 budget request contains sufficient funds to discharge its responsibilities for the entire year assuming water conditions in the West return to normal. Should the severe drought in the West continue through FY 1991, Western may need to purchase additional power to meet firm contractual commitments.

COMPOSITE POWER RATE

Mr. Bevill. Please provide a table showing the composite or average rate at which each of the Power Marketing Administrations sells wholesale power.

Mr. Davis. Mr. Chairman, I will provide for the record a table showing the composite rate for each of the PMAs.

(the table follows:)

POWER MARKETING ADMINISTRATIONS
Average Wholesale Power Rates for FY 1989

Alaska Power Administration	2.40 cents/kilowatthour
Bonneville Power Administration	2.48 cents/kilowatthour
Southeastern Power Administration	1.80 cents/kilowatthour
Southwestern Power Administration	2.76 cents/kilowatthour
Western Area Power Administration	1.41 cents/kilowatthour

These rates are determined by the total revenues received from wholesale power sales, divided by the number of kilowatthours sold.

RATE ADJUSTMENTS

Mr. Bevill. What, if any, are the anticipated rate adjustments being considered by each of the Power Marketing Administrations?

Mr. Davis. Mr. Bevill, I will ask each of the Administrators to address this question.

Mr. Cross. Existing rates at the Eklutna Project expire at the end of FY 1990. A study to determine new rates is underway. We do not expect a significant change.

Rates for the Snettisham Project do not expire until the end of FY 1991. At this time, we do not know if significant adjustments will be necessary in FY 1992.

Mr. Jura. The current wholesale power and transmission rates for the Bonneville Power Administration are in effect through September 30, 1991, absent repayment reform. In the fall of 1990, BPA will begin to analyze the adequacy of current rates to cover projected revenue requirements for the FY 1992-FY 1993 time period. New rates may then be proposed and filed for approval with the Federal Energy Regulatory Commission following formal hearings with BPA customers. Until BPA's analysis is complete, the amount of the rate adjustment needed is highly uncertain.

Although the likelihood appears small, BPA could end FY 1990 with net revenues less than zero. Should this occur, BPA may also adjust its major wholesale firm power rates with the cost recovery adjustment clause contained in current rates. The determination of such an adjustment would be made in the fall of 1990 and would take effect on January 1, 1991.

Major variables affecting progress toward meeting our financial goals, and therefore the decision to adjust rates, include winter snowpack and spring runoff which determine the quantity of water fueling BPA's hydrosystem; the world price of aluminum as it affects the rate paid and amount of power used by BPA's large aluminum industrial customers; the price of natural gas and oil as that affects the competition and demand for BPA's nonfirm energy; and the magnitude and timing of savings to be gained from current refinancing efforts on BPA's net billed Supply System bonds.

Mr. McAllister. During FY 1990 through FY 1992, Southeastern Power Administration anticipates three rate increases will take effect. On October 1, 1990, a rate increase is scheduled to take effect for the Georgia-Alabama System. On October 1, 1991, a rate increase is scheduled to take effect for the Kerr-Philpott System. On August 20, 1992, a rate increase is scheduled to take effect for the Jim Woodruff System.

Mr. Shafer. Preliminary data in the Power Repayment Studies, currently being developed by Southwestern, indicate the potential need for a rate increase in 1990 of about 15 percent for the Integrated System and no change in the rates established for the Robert Douglas Willis and Sam Rayburn Dam isolated projects.

Mr. Clagett. The rate adjustment process was initiated for the Salt Lake City Area Integrated Projects in October 1989, for the Washoe Project in August 1989, for the Loveland Area Projects (power and transmission) in February 1990, and for the Pick-Sloan Missouri Basin Program-Eastern Division (power) in March 1990.

For the balance of FY 1990, Western is pursuing a power transmission rate adjustment for the Boulder Canyon Project. During both FY 1990 and FY 1991, short-term rates are being processed for the Colorado River Basin (Navajo) Project by Western in accordance with the Interim Navajo Marketing Plan or the Final Navajo Marketing Plan, as appropriate. Rates for the Falcon-Amistad Project are adjusted annually using repayment formulas set by contract.

Revenue adjustments are expected for the Central Valley Project pursuant to a Revenue Adjustment Clause. The current CVP provisions provide a methodology to balance actual and estimated purchase power expenses, and gross commercial power revenues on a periodic basis. These adjustments are not considered rate adjustments.

REPAYMENT OF INVESTMENT

Mr. Bevill. What is the current status of each Power Marketing Administration in ensuring repayment of the Federal investment?

Mr. Davis. Mr. Bevill, I will ask each of the Administrators to answer that question.

Mr. Cross. APA has repaid $30 million of the total $133 million of Federal investment. We will continue an annual review of rates to insure revenues are adequate to meet repayment requirements.

Mr. Jura. Bonneville's foremost financial goal is to ensure its ability to make its annual payments to the Treasury on time. We have taken significant steps to improve Bonneville's ability to cope with revenue shortfalls and other risks and to control spending to ensure that cash reserves are sufficient to meet this goal.

Bonneville has fully met its planned payments to the Treasury in each of the last 6 fiscal years. As of September 30, 1989, Bonneville had repaid nearly $1.6 billion, or about 15 percent on a cumulative Federal power investment of approximately $10.7 billion.

Mr. McAllister. As of September 30, 1989, the total plant investment to be repaid by Southeastern was $1.4 billion, of which $292.8 million or 21 percent has been repaid, leaving a balance of $1.1 billion.

Mr. Shafer. Southwestern has repaid $186.7 million on an investment of $895.7 million or 21 percent as of the end of FY 1989. The unpaid investment is now $709 million. In order to assure repayment of the Federal investment, Southwestern performs an annual rate review. The FY 1990 review indicates the need for a rate increase of about 15 percent.

Mr. Clagett. As of September 30, 1989, Western has repaid $2.1 billion of the total investment to be repaid by power of $5.0 billion or 42.6 percent.

STATUS OF REPAYMENT

Mr. Bevill. Please provide a table showing the cumulative investment for each of the Power Marketing Administrations, the receipts to date and how these receipts have been used to offset operating expenses, to repay interest, investment costs and other purposes, and the remaining unpaid investment.

Mr. Davis. I would like to insert the following table for the record. It presents the Power Marketing Administrations' cumulative revenues and status of repayment through FY 1989.

(The table follows:)

Status of Repayment as of September 30, 1989 [1]
(Cumulative Dollars in Millions)

	Power Investment [2]	Power Revenues	Operation and Maint. (O&M)	Purchased Power	Interest Paid Thru 1989	Cumulative Repayment Thru 1989	Unpaid Investment
APA	133	105	37	0	37	31	102
BPA	10,665 [3]	23,971	3,752	14,071	4,582	1,566 [3]	9,099 [4]
SEPA	1,419	1,707	749	56	609	293	1,126
SWPA	896	1,642	505	485	465	187	709
WAPA	4,974	8,744	3,367	1,767	1,490	2,120	2,854 [4]
PMA Total	18,087	36,169	8,410	16,379	7,183	4,197	13,890

[1] All data are on accrual basis of accounting except as noted, and are based on the best information available.

[2] The power investment debt to be repaid includes irrigation and other nonpower investment assigned to power for repayment for BPA and WAPA.

[3] Cash rather than accrual basis.

[4] The unpaid investment does not include construction work in progress or capitalized deficits.

POWER MARKETING ADMINISTRATIONS PRIMARY STATISTICS

Mr. Bevill. Please provide a description of each of the Power Marketing Administrations showing the installed generating capacity marketed, the number of generating plants served, the number of substations owned, the length of transmission line owned, and the replacement cost of all facilities owned.

Mr. Davis. I will provide the information for the record.

(The information follows:)

PMA Statistics
(as of the end of FY 1989)

	Installed Capacity (MW)	Plants	Number of Substations	Transmission Lines (miles)	Replacement Costs (millions)
Alaska Power Administration	108	2	5	102	$336
Bonneville Power Administration	22,932 1/	30	387	14,727	2/
Southeastern Power Administration	3,092	22	0	0	2/
Southwestern Power Administration	2,150	23	24	1,380	2/
Western Area Power Administration	10,407 3/	51	259	16,554	2/
Total	38,689	128	675	32,763	

1/ BPA has 21,507 MW of hydro capacity and rights to 1,425 MW of thermal plant output, for a total capacity of 22,932 MW.

2/ We have not conducted studies to estimate replacement costs.

3/ Maximum operating capability.

APA DIVESTITURE

Mr. Bevill. Please describe the status of the proposed sale of the Alaska Power Administration.

Mr. Cross. APA has completed agreements with the prospective buyers for purchase of APA's two power projects. Legislation is not yet ready for Congressional consideration, but will be as soon as formal inter-agency review is complete.

Mr. Bevill. Who are potential purchasers of the Alaska Power Administration?

Mr. Cross. The potential purchaser of APA's Snettisham project is the State of Alaska Energy Authority. The potential purchasers of APA's Eklutna Project is a consortium of the existing customers; Anchorage Municipal Light and Power, the Chugach Electric Association, and the Matanuska Electric Association.

Mr. Bevill. When do you expect to submit legislation to Congress to authorize the sale of the Alaska Power Administration?

Mr. Cross. We do not have a firm schedule for submission of legislation to Congress. The legislation will be submitted as soon as internal review within the Administration is complete, sometime within the next few months.

Mr. Bevill. Please outline the activities and milestones to be accomplished between now and final approval by Congress of the proposed sale.

Mr. Cross. The proposed legislation can be submitted to Congress as soon as the formal inter-agency review is completed. We would stand ready to provide additional information and assist in any way that is helpful during Congressional consideration of this matter.

PUBLIC REACTION TO DIVESTITURE

Mr. Bevill. What has been the regional reaction to the proposed sale of APA facilities?

Mr. Cross. The regional reaction has been quite supportive but with continuing concern about possible ratepayer impacts.

Mr. Bevill. What reaction have you received from national organizations with regard to the sale of APA?

Mr. Cross. The national public power associations oppose divestiture of PMA assets, including Alaska, even though the purchasers of the APA projects are all members of the same national associations.

RATE IMPACTS OF SALE

Mr. Bevill. What is the anticipated impact on the ratepayers of the sale of APA?

Mr. Cross. The pricing and payment terms in the two purchase agreements would allow the sales to be completed without significant rate increases.

FY 1989 REPAYMENT

Mr. Bevill. What was the amount of the payment to Treasury to retire debt in FY 1989?

Mr. Cross. In FY 1989, payment of $6,142,000 was made to Treasury to retire debt.

OUTSTANDING DEBT

Mr. Bevill. What was the total indebtedness at the end of FY 1989?

Mr. Cross. Total indebtedness at the end of FY 1989 was $102,849,000.

SURPLUS POWER FORECASTS

Mr. Bevill. What are the latest forecasts with regard to the existence of surplus power in the Northwest?

Mr. Jura. The official long-range planning analysis for BPA and the Northwest is presented in the 1989 Pacific Northwest Loads and Resources Study published in November 1989.

Federal surplus firm energy, under various load forecasts, is presented in Table 1 and Figure 1. Under the medium load forecast, BPA is in balance for 1991 through 1993; in surplus, by 100 to 300 average megawatts, for 1994 through 2001; and in deficit starting in 2002. Under the medium load forecast, BPA experiences a firm energy deficit in 2000, but conversion of power sales contracts to capacity for energy exchanges and seasonal power exchanges extend the surplus through 2001. BPA experiences an energy deficit in 1992 under the high load forecast; in 1991 under the high-medium load forecast; and, in 2008 under the medium-low load forecast. BPA remains in surplus throughout the Study's 20-year planning horizon under the low load case.

Northwest surplus firm energy, under the five load forecasts, is presented in Table 2 and Figure 2. The Northwest, under the medium load forecast, is in surplus by 400 average megawatts in 1991, becomes deficit in 1994 and becomes deficit by 4400 average megawatts by the end of the Study's planning horizon. The Northwest experiences deficits in 1991 under the high load scenario, in 1995 under the medium-high load scenario, and in 1992 under the medium-low load case. The Northwest remains in surplus under the low load scenario.

Mr. Bevill. How has this changed from last year?

Mr. Jura. In contrast to the 1988 Study, the high, medium and low load forecasts all show significant increases of 500 average megawatts in 1991. By the year 2008, the medium forecasts remain the same, the high forecast increases by 1000 average megawatts, and the low forecast decreases by 300 average megawatts. Higher load forecasts reduce the amount of surplus.

There were two noteworthy developments in the past year which have significantly altered the loads and resources balance for BPA. First, increased Northwest load forecasts resulted in increased obligations for BPA and reduced the surplus. Current forecasts of aluminum industry loads are higher than forecasts of a year ago; the rest of the economy in the Northwest has also been more robust than previously predicted, and is expected to remain so for several years. BPA sales to its public utility customers are estimated to increase in 1991 by approximately 200 average megawatts and in 2008 by 50 average megawatts under the medium load forecast. Second, BPA made the decision to decrease the forecasted capacity factor from 70 percent to 65 percent for the WNP-2 nuclear resource, the effect of which is to reduce BPA resources by 56 average megawatts.

IMPACT OF RATE REFORM

Mr. Bevill. What impact would the proposed rate reform have on the aluminum and other similar industries?

Mr. Jura. BPA's power rates would likely increase by 31 percent in fiscal years 1991 and 1992, to 3.02 cents per kilowatt hour from 2.31 cents per kilowatt hour, assuming that the repayment reform proposal is adopted. BPA estimates that reductions in aluminum production and smelter closures would occur as a result of this increase. BPA's current Variable Industrial Rate is 1.62 cents per kilowatt hour because the U.S. Transaction Aluminum Price dropped below 74.8 cents per pound in December 1989. There is a three month lag with respect to the effect of aluminum prices in the Variable Industrial Rate. The proposed rate increase would also harm the cost-competitiveness of any remaining open smelters relative to other smelters in the world.

There are several other relatively small industries served directly by BPA that will be affected if their rates are increased by 31 percent. These pulp and paper, chemical, and primary metals industries purchase all of their power from BPA and are relatively intensive users of electricity. BPA has not yet done a detailed analysis of the impact of such a rate increase on these industries.

FY 1990 FINANCIAL FORECAST

Mr. Bevill. How does BPA's financial picture look for FY 1990?

Mr. Jura. Through the first quarter of this fiscal year, BPA's internal planning forecast projected net revenues of about $48 million by the end of FY 1990. This is $45 million below the assumption behind our current rate level, but still enough to ensure full coverage of all operating expenses, Federal interest and amortization.

Mr. Bevill. Will the Treasury debt repayment be made?

Mr. Jura. We are confident that we will meet our repayment obligations in full and on schedule this September.

THIRD AC FINANCING, CONSTRUCTION, AND NON-FEDERAL PARTICIPATION

Mr. Bevill. How will the proposal to have non-Federal participants finance two-thirds of the estimated cost impact the Third AC Intertie System upgrades? What are the advantages and disadvantages of this proposal?

Mr. Jura. The major advantage of the proposal to have non-Federal participants fund a portion of the Third AC Intertie project is that it would be expected to reduce BPA's required borrowing from the U.S. Treasury. The budget assumes that BPA's need for borrowing authority would be reduced by $45.6 million in FY 1991, or $72.3 million for the project as a whole.

However, if BPA cannot finance construction of the Third AC Intertie project with non-Federal funding, we will need to borrow the necessary funds from the U.S. Treasury. We believe this is not a significant problem because BPA already has the authority available to borrow up to $2.5 billion from the U.S. Treasury for transmission investment projects. As of the end of fiscal year 1989, about $1.26 billion of this authority committed.

Mr. Bevill. When will construction on the Third AC Intertie be initiated?

Mr. Jura. The first construction activity for the Third AC Intertie is the site development work at Captain Jack Substation, the California-Oregon Transmission Project line termination in Southern Oregon. The contract is scheduled to be awarded July 1, 1990.

Mr. Bevill. What is the status of non-Federal participation activities?

Mr. Jura. BPA is currently conducting a rate case to establish the pricing methodology for non-Federal participation. The rate process on the proposed pricing methodology began on November 22, 1989, with the publication of a Federal Register Notice. Testimony and rebuttal testimony has been filed by BPA and the parties. Cross-examination of BPA, Seattle City Light's policy witness, and Puget Sound Power and Light's technical witnesses occurred on March 19 and 20. Cross-examination of Seattle City Light's technical witness and of Western Public Agency Group's technical witnesses will occur on March 26. BPA's Draft Record of Decision will be issued on April 18, with the Final Record of Decision scheduled for May 11, 1990.

BPA's recent rebuttal testimony identified changes in the proposed pricing methodology that resulted in an estimated price lower than the $252 per kilowatt contained in our original testimony. The changes are based on decisions made regarding the assignment of facilities between the first 800 megawatt increment and the second 800 megawatt increment of the Third AC; primarily, certain series capacitor replacements originally assigned to the second increment will be included with the first increment, since in an agreement with the Environmental Protection Agency, BPA is already on schedule to remove and clean up such capacitors to eliminate PCB concerns. Conversely, as a result of these changes, some facilities which had originally been assigned to the first increment will now be reassigned to the second. The estimated price included in our rebuttal testimony is $223 per kilowatt.

BPA will be seeking FERC approval of a pricing methodology, not a participation price. The final price will be based on actual costs.

BPA has begun preparation of an implementation plan for its environmental impact statement on non-Federal participation. That EIS will include both non-Federal participation and ownership as options. Substantive work on the EIS will begin by the end of June 1990. BPA does not expect the final EIS to be completed until mid-1992. Contract negotiations with potential participants or owners may begin as early as public release of the draft EIS, but that is not certain at this time.

Mr. Bevill. How much funding has BPA included in its plans for FY 1990 and FY 1991 for the Third AC Intertie?

Mr. Jura. In the President's FY 1991 Budget, we have estimated obligations for the Third AC of $88.8 million for FY 1990 and $67 million for FY 1991. However, new procurement schedules may shift the need for a substantial amount of the FY 1990 obligations to FY 1991.

The budget assumes payments of $45.6 million will be collected in FY 1991 from non-Federal participants in the Third AC Project. If we do not receive non-Federal participation payments, we will utilize BPA's existing borrowing authority to finance the project and keep it on schedule.

Mr. Bevill. What Third AC Intertie activities is BPA accomplishing in FY 1990? What are the estimated costs for these activities?

Mr. Jura. For FY 1990, we are continuing system planning, design, survey, and land acquisition activities. In addition, we will procure materials such as breakers, relays, and structures in June 1990 in order to stay on schedule. We also plan to award a construction contract in July 1990 for site development work at Captain Jack Substation in Southern Oregon. This substation is the termination for the California-Oregon Transmission Project line. We estimate these activities will cost $32.8 million in FY 1990.

The budget assumes an additional $56 million will be obligated in FY 1990 for the Third AC Intertie. This includes $32.4 million for Third AC Intertie reinforcements and $23.6 million for our share of the Alvey-Meridian line which is planned for construction by Pacific Power and Light Company. The $32.4 million for Third AC Intertie reinforcements is primarily for series capacitors.

We now expect to use the full $56 million to contract for series capacitor replacements as part of a PCB clean-up agreement between Bonneville and the Environmental Protection Agency. These capacitors must be replaced regardless of the Third AC Intertie schedule. Because of this agreement, these costs would then be included with the system reactive budget item rather than with the Third AC Intertie. The new procurement schedules may shift the date for these obligations into FY 1991 from FY 1990.

NEPA DOCUMENTATION FOR THIRD AC

Mr. Bevill. What is the status of the NEPA documentation for the Third AC Intertie?

Mr. Jura. The National Environmental Policy Act (NEPA) documents for construction and operation of the Third AC Intertie are complete. I signed a Record of Decision (ROD) addressing the construction, ownership, operation, and maintenance of the Third AC Intertie on September 27, 1988. That ROD presumed Federal ownership and operation of the additional Intertie capacity in Oregon except for those portions owned by Pacific Power and Light and Portland General Electric.

The question of participation in the northern portion of the Third AC and the option of ownership of capacity by other utilities are the subject of another Environmental Impact Statement (EIS) being prepared by BPA. This EIS was delayed while BPA proceeded with a rate case on the proposed pricing methodology for participation, but the process will be resumed shortly when an Implementation Plan for the EIS will be submitted to the Department of Energy in accordance with its procedures. According to the current schedule for the EIS, a Draft EIS is expected to be available to the public in July 1991, and the Final EIS is expected to be available in mid-1992.

BPA'S INTERTIE ACCESS POLICY

Mr. Bevill. Please describe BPA's Intertie Access Policy.

Mr. Jura. BPA's current intertie policy is the Long-Term Intertie Access Policy (LTIAP) adopted May 17, 1988. The LTIAP established procedures for allocating the Federal capacity, both firm and nonfirm, available on the transmission lines interconnecting the Northwest with the Southwest (Intertie).

In addition to assuring BPA of reasonable access to its own Intertie capacity in order to sell its surplus power and participate in seasonal exchanges, thereby enhancing BPA's ability to repay its obligations to the U.S. Treasury, the LTIAP provides significant rights to non-Federal utilities. The LTIAP reserves 800 megawatts of capacity for long-term firm arrangements by non-Federal utilities. It also provides significant non-Federal utility access to the Southwest economy energy market.

For conditions other than spill or near-spill on the system, the LTIAP also initiated an experiment in hour-by-hour competition among non-Federal sellers for the Southwest economy energy market. Prior to the LTIAP, that market had been primarily allocated among sellers by a strict prorata allocation mechanism which was labelled as anticompetitive by Southwest buyers. The competition among non-Federal sellers prevails during the experiment until September 30, 1991, when BPA will assess its impacts.

There are additional provisions in the LTIAP for the protection of fish and wildlife. BPA has incorporated the Northwest Power Planning Council's protected area plan which restricts construction of new hydroelectric projects on streams or rivers if they are in a protected area. Utilities which construct or purchase power from new projects in such areas are restricted from Intertie use in specified conditions.

While there are many competing demands on the Intertie, the LTIAP balances those demands. For example, the LTIAP enhances BPA's ability to repay Treasury, protects our investments in fish and wildlife, protects our ability to maintain stable rates to our total-requirements customers, and provides other advantages to both the Northwest and Southwest utilities.

Extraregional utilities, including Canada, are provided access for nonfirm use of the Intertie when the regional utilities do not require the full capacity. In addition, extraregional utilities are provided access for firm use under a provision of the LTIAP. BPA tested this provision in 1989. In August 1989, BPA and British Columbia Hydro and Power Authority (BC Hydro) entered into a short-term firm Intertie transmission agreement to allow BC Hydro to make a 4-month power sale to the Sacramento Municipal Utility District.

The LTIAP also balances the use of the Intertie between firm and nonfirm use, provides better planning certainty for BPA and the utilities, and allows more efficient use of generating resources in both regions.

MARKETING FIRM SURPLUS POWER

Mr. Bevill. Please describe Bonneville Power Administration's (BPA) activities in marketing surplus power outside the region last year.

Mr. Jura. During the last year BPA entered energy load/resource balance and announced that it was no longer in the long-term surplus firm energy market outside the region. In fact, in September 1989, we converted our long-term power sales with Burbank, Glendale, Pasadena and Edison to capacity for energy exchanges.

BPA did, however, conduct negotiations with various California parties to attempt to complete ongoing deals or initiate surplus firm capacity marketing transactions. Among these efforts are the following:

Los Angeles Department of Water and Power (LADWP) - Following a time-intensive, 2-year negotiation with LADWP for a long-term surplus power/exchange transaction, the parties failed to reach agreement in

December 1988, due in part to a revised LADWP power needs forecast, and a desire by LADWP to assess the outcome of the Edison-San Diego merger discussions. BPA followed up with several visits to LADWP in 1989 to see if LADWP had any interest in a capacity transaction.

Modesto-Santa Clara-Redding (M-S-R) - Following a year-long negotiation and M-S-R offer, BPA executed a 20-year surplus power sale/exchange agreement with M-S-R in October 1989, contingent on energization of the Third AC.

Anaheim and Riverside - BPA is close to receiving an offer and, subject to P.L. 88-552 notice, intends to execute long-term surplus capacity/exchange transactions with these two municipals. Azusa, Banning, and Colton were originally involved, but dropped out.

Northern California Power Agency (NCPA) - BPA attempted to enter into a long-term surplus capacity sale (or exchange) agreement with NCPA but was unable to conclude a bilateral sale. We also attempted a joint venture with either Pacific Gas or Edison to do a long-term power sale with NCPA, where BPA would provide capacity and Edison or Pacific Gas would provide energy. Currently, BPA and Washington Water Power are negotiating a firm displacement capacity transaction with NCPA.

Basin Electric (Basin) - BPA attempted to develop a joint venture with Basin in order to provide for long-term surplus power sales to numerous California parties, where BPA would provide surplus capacity and Basin would supply energy.

Sacramento Municipal Utility District (SMUD) - BPA contacted SMUD several times during 1989 to see if SMUD was interested in a surplus capacity transaction.

ALUMINUM INDUSTRY PRICING STRUCTURE

Mr. Bevill. Please describe how the pricing structure used to sell electricity to the aluminum industry in the Northwest affected BPA revenues last year.

Mr. Jura. Since August of 1986, the price of electricity sold to the aluminum industry in the Pacific Northwest has been based on a variable rate, whereby the price of electricity is a function of the price of aluminum. The variable rate is termed VI Rate, and the standard industrial rate is termed IP Rate. The VI Rate varies from a low of 1.62 cents per kilowatt hour when the price of the metal reaches 68.0 cents per pound, to a high of 2.88 cents per kilowatt hour when the price of the metal reaches 85.1 cents per pound. During FY 1989, BPA averaged .58 cents per kilowatt hour more from our aluminum sales than we would have realized under standard IP service, and $138 million more in total revenue. Since the start of the VI rate, BPA has averaged .30 cents per kilowatt hour more than IP service, and $157 million more in total revenue. A summary of VI revenues, loads, and rates for the last fiscal year and for the period August 1986 to September 1989, is provided in a table I will insert into the record.

(The information follows:)

Period	Total VI Revenue ($ M)	Total VI Sales (MWh)	Average VI Rate (cents)	Total Revenue if @ IP ($ M)	IP Rate (cents)	Difference in Revenue ($ M)
FY 1989	695.7	24,152,603	2.88	557.5	2.30	138.2
8/86-9/89	1,784.8	68,998,029	2.59	1,627.5	2.29	157.3

The above numbers understate the beneficial impact of the VI on BPA revenues. We estimate that the VI Rate allowed the restart of three closed smelters which would not have reopened under IP service. The number of jobs estimated to be saved is 1,600. The three smelters used 491 average megawatts of power in FY 1988, approximately 20 percent of total sales to aluminum smelters. Overall the aluminum industry provided $740 million in power sales revenues during FY 1989, compared to $717 million the previous year.

Mr. Bevill. What was the impact on the aluminum industry?

Mr. Jura. During 1989, aluminum prices rose to a level that triggered the highest electricity rates that BPA can charge its aluminum smelters under the Variable Industrial Rate schedule. However, the Pacific Northwest aluminum smelters still earned record revenues because aluminum prices were significantly higher than the level that is required to trigger the maximum electricity rate.

FISH AND WILDLIFE PROGRAM EXPENDITURES AND LOST REVENUES

Mr. Bevill. What are BPA's expenditures and lost revenues for the fish and wildlife program in FY 1989, FY 1990, and FY 1991?

Mr. Jura. Expenditures in FY 1989, FY 1990, and FY 1991 for the BPA Fish and Wildlife programs are $34.7 million, $48.6 million, and $52.6 million, respectively. The breakdown of planned obligations between expenses and capital investments is shown in a table which I would like to insert into the record.

(The information follows:)

BPA FISH AND WILDLIFE PROGRAM EXPENDITURES

($ Millions)

	FY 1989	FY 1990	FY 1991
Capital	8.1	17.0	16.9
Expense	26.6	31.6	35.7
Total	34.7	48.6	52.6

BPA losses in power revenues due to the Fish and Wildlife Program result from the implementation of two fisheries measures: The Water Budget and Spill programs. The Water Budget is intended to increase the level of flows to facilitate the spring migration of juvenile salmon. Spill, which is distinct from the Water Budget, diverts juvenile fish away from the turbines at dams that lack adequate bypass screens. Spill provides interim protection for juvenile fish. Once screens are installed, BPA expects that spill will not be necessary.

Using power planning models, we have estimated the expected average revenue losses due to the Water Budget and Spill programs. These estimates of lost revenues are approximately $40 million per year for the Water Budget, and $15 million per year for the Spill programs.

Estimates of revenue losses due to the Water Budget and Spill programs have a high degree of uncertainty because the actual costs depend on variations in water supplies and marketing conditions. As a result, the actual revenue losses in a specific year can be significantly different. For example, we estimate that the lost revenues due to Water Budget and Spill were $74 million and $19 million, respectively, in 1986 (an average water year), and $11 million and $9 million in 1987 (a low water year). However, BPA has not determined the actual revenue losses attributed to the Water Budget and Spill programs for each operating year.

JUSTIFICATION FOR FISH FACILITIES

Mr. Bevill. Describe the need for and justification for the Yakima Basin Screen Facilities, Phase II.

Mr. Jura. The Phase II Screen program involves fish screening facilities for juvenile salmon and steelhead outmigrating from the Yakima system, primarily from tributary streams. The Yakima Hatchery project (Section 900 of the Columbia Basin Fish and Wildlife Program) will produce salmon and steelhead juveniles for planting in tributary streams in the Basin. The phase II Screening Facilities will protect BPA's investment in the hatchery project by protecting these juvenile fish from being lost into irrigation diversions as they migrate downstream. The Phase II program complements the Phase I Screening program (initiated in 1982, on the mainstem of the Yakima River). The Phase I Screening Program is now complete, at a total cost of $57 million (of which BPA contributed $15 million). BPA's total cost for Phase II Screens Project is estimated at $10 million.

BPA MARKETING EFFORTS

Mr. Bevill. Describe what improved and innovative marketing arrangements Bonneville Power Administration (BPA) will be focusing on.

Mr. Jura. In the mid-1980s BPA made a commitment to attempt to sell its surplus. In 1988, following our annual strategic planning session, BPA clarified that goal to be "concluding long-term surplus power transactions up to 600 average megawatts in a mixed portfolio." Essentially, BPA achieved the marketing objectives we established for ourselves. In 1989, BPA concluded its marketing of surplus firm energy due to increases in Northwest firm energy loads and the conclusion of several in-region and extraregional surplus transactions.

In 1988, BPA released the Intertie Development and Use (IDU) EIS which provides the environmental coverage for BPA's extraregional marketing and non-Federal use of BPA's intertie under the Long-Term Intertie Access Policy (LTIAP).

Assuming the conclusion of current negotiations, as well as contracts utilizing the remaining Intertie capacity reserved for non-Federal use, BPA may have utilized the environmental coverage available for the combination of BPA sales and non-Federal use. This means BPA would not enter into additional transactions without completing new environmental analyses.

BPA does have one other negotiation we are working on which is an extension of a regional capacity sale to Pacific Power & Light (PP&L). Our resource planning documents show surplus capacity sufficient for this transaction. We expect to perform separate, new environmental analysis on the PP&L proposed contract.

During the past decade, BPA has faced increasing constraints regarding operation of the hydro system as a result of demands to serve fish, recreation, and irrigation interests. BPA does not actually control river operations but must share this responsibility with the Bureau of Reclamation and the Corps of Engineers. Conflicts over river operation led to our discussions with regional interests during the fall of 1989 about the need to resolve these conflicts. BPA believes that this problem has to be resolved and we are embarking on a public involvement program this spring to address these issues.

BPA's future priorities will focus on resource acquisition strategies for the future; renegotiation of its Pacific Northwest requirements contracts with utilities, Federal agencies, and direct-service industries; and other issues of regional importance to all parties.

STATUS OF NUCLEAR PLANTS

Mr. Bevill. Does the FY 1990 Resource Program indicate a need for construction restart of the nuclear power plants?

Mr. Jura. In its 1987 WNP-1 and -3 Study, BPA concluded there was a 34 percent chance of needing either WNP-1 or WNP-3 by 2005 to meet its load growth. BPA's current draft 1990 Resource Program indicates there is less than a 10 percent chance of needing either WNP-1 or WNP-3 by 2005. These probabilities represent the likelihood that BPA, not the region as a whole, will need the projects.

The decrease in the probability of need is due to an increase in the supply of lower cost alternatives, primarily conservation, cogeneration and natural gas fired combustion turbines used in conjunction with nonfirm hydropower. However, small changes in assumptions about resources, specifically the long-term cost of natural gas, could impact the probability of need for WNP-1 and WNP-3.

CRITERIA USED TO CAPITALIZE AND EXPENSE CONSERVATION

Mr. Bevill. What criteria are used to determine which conservation activities are capitalized and which are expensed?

Mr. Jura. Beginning in the early 1980s BPA capitalized several types of conservation activities to achieve long run resource savings. On balance, this investment has added 350 average megawatts to BPA's power resources at less than 3 cents per kilowatt hour. This is slightly more than BPA's cost to deliver existing power.

We capitalize investments in measures that we believe will have long-term benefits beyond the rate period. For example, we project many years of savings from the installed energy efficiency measures in the Residential Weatherization Program, the Super GOOD CENTS Program, the Northwest Energy Code Program, and the Commercial Incentives Pilot Program (CIPP). Capitalizing these activities matches benefits with costs over a period of time, consistent with BPA's establishment of rates.

Expensed activities are generally those costs incurred during any given rate period that do not have long-term benefits, and are therefore paid as current expenses from revenues in that fiscal year. For example, staff costs, training, utility administrative costs, and program costs associated with advertising, marketing, and promotion are expensed. Some program activities that are expensed include Electric Ideas (an information clearinghouse), our State Technical Assistance program, and research and development activities with unknown long-term benefits.

MAJOR LITIGATION

Mr. Bevill. Please provide the status of the major issues under litigation affecting BPA.

Mr. Jura. I will provide for the record the status of the major issues under litigation affecting BPA.

(The information follows:)

1. Major Resources & General Legal Services Litigation

Bonneville Power Administration v. Washington Public Power Supply System. No. C82-1252 (W.D. Wash. filed October 26, 1982). Cost-Sharing: Issue is whether the costs of common facilities and services for the twin plants, Washington Public Power Supply System Nuclear Project (WNP)-1 and 4, and WNP-3 and 5, should be reallocated in that a greater portion of the costs will be absorbed by WNP-1 or 3, the net-billed projects. Briefs were filed, and oral argument was held on September 22, 1989, on the question of what form of cost-sharing, if any, was contemplated by the WNP-4/5 Bond Resolution. A decision by the court is pending.

In re Washington Public Power Supply System Securities Litigation. J.P.M.D.L. No. 551 (W.D. Wash. filed August 23, 1983). This is a consolidated proceeding involving 13 separate class actions brought on behalf of those who purchased WNP-4 and -5 bonds. The bond purchasers sued BPA and the Supply System as well as the underwriters, attorneys, architect/engineers, financial consultant, consulting engineer, and attorneys involved with the participants in the Supply System WNP-4 and 5. BPA has been dismissed from the case. All parties in this litigation have now settled. The settlement agreement has been approved by Judge Browning. However, the case will remain technically active until all appeals to the settlement agreement have been dismissed by the Ninth Circuit. As part of the settlement, plaintiffs agreed to dismiss their suits against Bonneville. All parties agreed to forego any future claims they may or may not have had against BPA, or the assets, revenues, and funds of the net-billed plants as a result of the Project 4 and 5 default.

"Chinese Wall" cases. The "Chinese Wall" cases are lawsuits brought by contractors regarding claims for goods and services provided for WNP-4 and -5. In some cases, these contractors also worked on other Supply System projects (WNP-1, -2, or -3), raising issues as to which project(s) received the benefit of materials and services. Although BPA is not a party in these lawsuits, the agency is concerned because the litigants have asserted a right to execute on all the assets of the Supply System, including WNP-1, -2, and -3 to satisfy any judgments in their favor for WNP-4/5 debts. The term "Chinese Wall" derives from the Supply System's legal position that each project is a separate legal entity, and one project cannot assume responsibility for debts of any other project. There are now two active "Chinese Wall" cases, the American Air Filter case and the Guy F. Atkinson case. In the American Air Filter case, the State court judge has ruled that the judgment is only recoverable from WNP-4 and -5 funds. An appeal of this case is now active. In the Guy F. Atkinson case, the Supply System has filed an answer and counterclaim.

Snohomish County Public Utility District No. 1 v. PacifiCorp, dba Pacific Power and Light Company; Portland General Electric Company; Puget Sound Power and Light Company; The Washington Water Power Company; The Montana Power Company; the Bonneville Power Administration; and Washington Public Power Supply System, U.S. Dist. Ct., Oregon, No. 89-1295 (November 28, 1989). This litigation relates to the Project One (WNP-1) Exchange litigation. Snohomish seeks 1) a declaration of the rights of the parties to the Project One Exchange Agreements regarding the price to be paid by the Project One Companies from July 1990 to July 1996; 2) damages from the Project One Companies in an unspecified amount; or 3) restitution from the Project One Companies to either Bonneville, the Supply System, or the Project One Participants, in an amount of the unjust enrichment accruing to the Project One Companies from the provision of power under the Project One Exchange Agreements. Oral arguments were heard on March 5, 1990, on the issue of Snohomish PUD's standing.

WPPSS v. General Electric Co. U.S. Dist. Ct., E. Dist. of Wash., No. C-85-098-AAM. The Supply System is suing General Electric Company (GE) for fraud and breach of contract in connection with the WNP-2 containment vessel. The basis of the Supply System's fraud claim is that GE falsely represented that its boiling water Nuclear Steam Supply System (NSSS) and pressure suppression containment specifications were "proven" and "tested," when GE knew that this was not the case (i.e., unresolved and serious problems existed). The breach of contract claim alleges that GE failed to supply a safe and licensable NSSS and containment design specifications in a timely fashion. The case is underway.

2. Major Rates Litigation

CP National Corporation v. Bonneville Power Administration, et al., Ninth Circuit Nos. 89-70262 and 90-70029. These consolidated cases challenge BPA's denial, and FERC's subsequent approval of that denial, of CP National's demand for the return of $1.1 million in Residential Exchange benefits paid upon rates that were terminated by the Oregon PUC with an order to refund all money collected under them.

Southern California Edison Co., et al., v. Bonneville Power Administration, Ninth Circuit Nos. 87-7477, et al. These consolidated cases challenge BPA's 1983 nonfirm energy rates as approved by FERC after the second section 7(k) hearing on violation of legal standards and discrimination grounds. Case was argued and submitted to the Court on March 9, 1989.

3. Major Power Litigation.

Puget Sound Power and Light v. United States of America, Cl. Ct. No. 90-193C, (March 1, 1990). Puget alleges that BPA has breached the regional preference provisions in Puget's power sales contracts with BPA. Puget alleges that BPA has: (1) failed to guarantee Puget "first call" on its electric power by marketing power first outside the Northwest before marketing it in the Northwest; (2) disposed of electric power outside the Northwest which was not surplus to the needs of the Northwest and Puget or for which there is a market and demand in the Northwest; and (3) refused to sell electric power to Puget at established rates or wrongly priced power it offered to Puget at market rates BPA could obtain outside the Northwest. Puget seeks damages of $20 million and a declaratory judgment. BPA and the Department of Justice are preparing an answer or alternative pleading, due 60 days from the date of filing.

City of Seattle v. FERC, Ninth Circuit, No. 89-70486. Seattle City Light (SCL) filed petition for review of FERC orders requiring SCL to provide power to Pend Oreille PUD No. 1 under the terms of the Federal license issued to SCL for the Boundary Dam in Washington. SCL raised issues pertaining to BPA's implementation of the Northwest Power Act. BPA intervened in the case. SCL's opening brief is due April 3, 1990.

Public Utility District No. 1 of Clark County v. United States, Claims Court, No. 623-88C - Clark County PUD No. 1 originally brought suit in the Ninth Circuit alleging BPA violated the Northwest Power Act, breached an oral contract to purchase, and made an arbitrary and capricious decision under the Administrative Procedures Act in deciding not to acquire a cogeneration resource offered by the PUD. The Ninth Circuit dismissed the contract claim for lack of jurisdiction. The PUD then brought suit in the Claims Court. The Government filed motions for dismissal and for summary judgment.

California Energy Commission v. Bonneville Power Administration, No. 88-7280 (Ninth Circuit, filed July 21, 1988). This and other consolidated cases challenge BPA's Long Term Intertie Access Policy issued on May 17, 1989. Briefs have been filed; oral argument has been held; and the case is submitted for decision.

Public Utility District No. 1 of Clark County v. Johnson. No. 623-88L (Cl. Ct. 1988). The PUD claims BPA agreed to purchase power produced by a cogeneration resource and seeks damages.

Public Utility District No. 1 of Douglas County et. al. v. Jura, No. 89-70382. This case finds three public utility districts and three investor-owned utilities challenging BPA's policy interpreting section 4(h)(11)(A)(ii) of the Northwest Power Act. The policy specifies when BPA will compensate entities for certain actions taken by Federal agencies which impose measures to protect fish and wildlife. The case has been briefed and is awaiting oral argument.

Gregory H. Bowers v. James Jura, No. C90-331 (W. Dist. Wash., filed March 6, 1990). Complainant challenges on environmental and other grounds BPA actions taken in furtherance of the construction of the Third AC Intertie. Declaratory judgment and injunctive relief are sought.

FY 1989 REPAYMENT

Mr. Bevill. What was the amount of the payment to Treasury to retire debt in FY 1989?

Mr. Jura. The amount of the principal payment to the U.S. Treasury to retire debt in FY 1989 was $152.2 million.

The final distribution of BPA's Treasury payment between Corps of Engineers and Bureau of Reclamation operation and maintenance, interest, and amortization of appropriations occurs about 3 months after the end of the fiscal year when audited financial statements become available. BPA's detailed budget is submitted before the final distribution can occur. For this reason, the $152.2 million amount is slightly different than the $150.7 million shown for amortization in BPA's detailed budget.

Mr. Bevill. What was the total indebtedness at the end of FY 1989?

Mr. Jura. BPA's total repayment obligation is $15.2 billion which includes the following elements. The amount of BPA's total Federal repayment obligation at the end of FY 1989 was $9.1 billion. This consists of $1.8 billion in debt for bonds issued to the U.S. Treasury, $6.5 billion in appropriated power and transmission system investment, and $0.8 billion in irrigation assistance repayment obligation. BPA is also responsible to pay the debt service on certain non-Federal projects, including three Washington Public Power Supply System nuclear plants. As of the end of FY 1989, the principal outstanding on non-Federal projects was $6.1 billion.

SOUTHEASTERN POWER ADMINISTRATION

SALE OF SEPA ASSETS

Mr. Bevill. Please describe the proposal contained in the FY 1991 budget request to sell certain exclusive power marketing rights of SEPA in 1991 to existing power customers.

Mr. McAllister. The Administration has proposed to sell the marketing rights of the Georgia-Alabama System to the preference customers in the Georgia-Alabama System for an estimated $1.2 billion.

Mr. Bevill. Has legislation been submitted to the Congress for this proposal? If not, when will it be submitted?

Mr. McAllister. No legislation has been submitted at this time. However, it currently is being drafted in the Department of Energy.

Mr. Bevill. What are the advantages and disadvantages of the proposed divestiture?

Mr. McAllister. The Administration believes that certain assets currently owned by the Federal Government could be managed better by private industry. A major disadvantage is that divestiture is a controversial subject among the preference customers in the Southeast. Some of the preference customers have expressed opposition to the sale of Southeastern.

Mr. Bevill. How much money is included in the FY 1991 budget to study the sale of SEPA assets or for any activities relating to the sale?

Mr. McAllister. There is no money in the 1991 budget to study divestiture.

HYDRO POWER GENERATION

Mr. Bevill. Have the hydroelectric generation parameters for any Corps project on which you develop sales contracts changed in a way that impacts these contracts?

Mr. McAllister. The preference customers in the Southeast are very concerned about proposed or implemented water control plans which will alter the long established operations of the Government-owned projects. The customers estimate that they could be damaged to the extent of $63 million per year to replace the power lost by these modified project operational procedures.

Mr. Bevill. Are any Corps projects undergoing review of their generation parameters? Please list these projects and when these studies are scheduled to be completed.

Mr. McAllister. Actions are currently pending which could affect generation at a number of projects.

Georgia-Alabama System

Savannah River Basin: (Hartwell, Richard B. Russell, and J. Strom Thurmond projects).

The Corps of Engineers' Drought Contingency Plan for the Savannah River projects has been completed and implemented. It will reduce generation during the summer months and during droughts.

Chattahoochee River Basin: (Buford, West Point, Walter F. George, and Jim Woodruff projects).

The Corps of Engineers' Water Control Plan and Post Authorization Change for the Reallocation of Storage from power to water supply are under study. Both plans would reduce the power output. No date has been set for completion of the two studies. The re-allocation of storage is anticipated to be included in the comprehensive study requested by Mr. Bevill, which the Corps estimates will take four years to complete.

Cumberland River Basin

Wolf Creek Project - The Corps of Engineers is studying the possibility of increasing the output of the generating units. No date has been set for completion of study.

STATUS OF RESERVOIR LEVELS

Mr. Bevill. What is the current reservoir level status?

Mr. McAllister. Currently the projects in the Southeast are at or above rule curve in all of the projects. In the Georgia-Alabama System the projects are currently flooding.

RICHARD B. RUSSELL MARKETING

Mr. Bevill. Please explain the uniqueness and complexity of SEPA's negotiation on the Richard B. Russell and Carters power sale contracts.

Mr. McAllister. The upcoming negotiations on the Richard B. Russell and Carters power sale contracts deal with pump storage units rather than conventional units. After May 31, 1991, the present contracts provide that 122 preference customers in 4 utility service areas in 4 states will assume responsibility for the supply of pumping energy and will receive the energy resulting from the pumping operation at the Carters Project. It is necessary to make economic determinations, including the need for power the following day or week, who will provide the pumping energy, at what cost, and how benefits will accrue to various utility areas and to the individual preference customers within each utility area.

When the Russell pumping units come online, 69 preference customers in 3 additional utility service areas in 2 additional states will be involved. Additionally, the Russell pumping units are the subject of environmental litigation and cannot be operated in the pumping mode without approval of the court. Considering the long lead time necessary to negotiate a power sale contract, negotiations will have to proceed prior to approval by the court and subject to any limitations placed on the units by the court.

Provisions regarding coordination among the power recipients will have to be included in the upcoming sales contracts for the pumping projects.

POWER SALES CONTRACTS

Mr. Bevill. Describe the terms and parameters of a typical SEPA contract for the sale of power. Include factors such as quantities of electricity, timing constraints of deliveries, etc.

Mr. McAllister. Southeastern sells peaking power to preference customers. Contracts are generally for a 10-year period. Total available capacity after reserves and losses is allocated to individual preference customers. Minimum amounts of energy are guaranteed based on the amount of energy available in a particular historic adverse year.

DEBT REPAYMENT

Mr. Bevill. What was the amount of payment to the Treasury to retire debt in FY 1989?

Mr. McAllister. In 1989, $15.6 million was repaid to the Treasury to retire debt in three of the four Southeastern systems. This is offset by a deficit in the fourth system (Georgia-Alabama) in the amount of $12.2 million leaving a net repaid of $3.4 million.

Mr. Bevill. What was the total indebtedness at the end of FY 1989?

Mr. McAllister. The unpaid investment of Southeastern as of 9-30-89 was $1.1 billion dollars. Primarily as a result of continued droughts in the Southeast, repayment schedules for the Georgia-Alabama System accumulated large deficits over the fiscal year 1986 through 1989. During fiscal year 1989, Southeastern was able to implement a rate increase which had not been anticipated by then existing contracts. The rate increase was designed to insure system repayment in a timely manner.

During fiscal year 1990, a formal rate presentation will be submitted to the Federal Energy Regulatory Commission for the Georgia-Alabama System rates for the period beginning October 1, 1990.

BELOW AVERAGE HYDROPOWER GENERATION

Mr. Bevill. The FY 1990 appropriation includes language dealing with below average hydropower generation. Has this provision been used?

Mr. Shafer. The provision in the FY 1990 appropriation language dealing with below average hydropower generation has yet to be used. The provision continues to be important in providing the flexibility to meet purchase requirements during periods of below average hydrogeneration, both in the current year and future years, including FY 1991.

Mr. Bevill. Does this provision need to be included in the FY 1991 appropriation language?

Mr. Shafer. It is Southwestern's opinion that the words "ongoing basis" as used in FY 1990 Act (Public Law 101-101) indicates that it was the intent of Congress to make the purchases of power through the continuing fund permanent legislation so that supplemental appropriations would not be required during periods of below average hydropower generation. Therefore, I believe, and if the Subcommittee concurs, the provision need not be included in the FY 1991 appropriation language.

W. D. MAYO DAM

Mr. Bevill. What is the status of hydropower development at the W. D. Mayo Dam?

Mr. Shafer. Southwestern notified the Cherokee Nation that their proposal as presented is unacceptable, based on the inequity of the distribution of costs, risks and benefits. We have also requested them to consider reviewing and reformulating the proposal to lower total cost and redistribute costs, risks, and benefits. The Cherokee Nation is evaluating other development options.

Mr. Bevill. Has SWPA developed a position yet on the economic feasibility of this project?

Mr. Shafer. Yes. Our financial evaluation of the project shows it to be comparable to the least cost alternative, or as you have expressed it, economically feasible, but it is still a very high cost project. The proposal of the Cherokee Nation, as presented, distributes the costs, risks, and benefits of the project disproportionately among the potential recipients of the project power, and we have determined it to be unacceptable as formulated.

Mr. Bevill. Have other groups developed positions?

Mr. Shafer. In January 1989, the Board of Directors of the Southwestern Power Resources Association, an organization whose membership includes many of the Southwestern preference customers, concluded that the Mayo Project was hydrologically sound but requested that the project be deferred until the cost could be reduced.

Mr. Bevill. What future activities and alternatives will SWPA be investigating? When will these investigations occur?

Mr. Shafer. Southwestern has indicated to the Cherokee Nation its willingness to consider alternative proposals for the development of the Mayo Project. However, further Southwestern involvement in the project will be dependent on future actions by the Cherokee Nation.

CURRENT STATUS OF RESERVOIR LEVELS

Mr. Bevill. What is the current status of reservoir levels compared with average conditions?

Mr. Shafer. As of the date of these hearings, all of the reservoir levels at projects with hydroelectric power facilities whose output is marketed by Southwestern are in the flood control pool (well above average conditions).

HARRY S. TRUMAN PROJECT

Mr. Bevill. What is the status of the Harry S. Truman project?

Mr. Shafer. The project continues to be operated under severe limitations. Presently only 44% of the project can be marketed on a long term basis.

Mr. Bevill. What effect is the loss of the pumpback feature having on recovering the costs allocated to hydroelectric power at the project?

Mr. Shafer. Without the pumpback feature, the project's power output has little dependability: thus the amount of reliable power that can be marketed is limited. The use of only four (five during three winter months) of the six units at the project results in the loss of operational flexibility and further restricts the production of reliable power. These restrictions mean that only about 44 percent of the project's total resource capability can be marketed on a long-term basis which allows only 44 percent of the costs of the project to be recovered.

Mr. Bevill. Has consideration been given to reducing the costs allocated to hydroelectric power at the project?

Mr. Shafer. Yes. Based on power features deemed commercially operable, only 44 percent of the total cost presently allocated to power has been assigned for cost recovery. The remaining 56 percent is being deferred until an interim cost allocation is agreed to. This procedure was endorsed by the Federal Energy Regulatory Commission in its approval of Southwestern's present rates.

Mr. Bevill. What is being done to resolve this problem?

Mr. Shafer. In order to resolve the operational problems, a negotiating team was formed composed of the State of Missouri, the U. S. Army Corps of Engineers, Southwestern, and the Associated Electric Cooperative Incorporated, who is the scheduling agent of the project. Issues were identified and an agreement was reached on an interim operating plan. The plan was approved by the U. S. Army Corps of Engineers on March 8, 1990. The plan will be followed while studies are conducted to evaluate the impacts of, and mitigation requirements for, the operation of Harry S. Truman at full design capacity with pumpback capability. The U.S. Army Corps of Engineers is also developing an interim cost allocation which reduces the costs to be allocated to hydroelectric power as a result of the reduced operational capability of the project.

Mr. Bevill. When do you expect final decisions to be made on pumpback and 6 unit operation?

Mr. Shafer. We expect that the studies needed to determine what is required in order to implement pumpback and 6 unit operation will be completed within about five years. We anticipate the 5-year study period will be required because of the complexity of the problems to be addressed. We understand that the Corps of Engineers' Waterway Experimental Station in Vicksburg, Mississippi has already started to work on the hydraulic design analysis.

FACILITATING FEDERAL HYDROELECTRIC PROJECTS

Mr. Bevill. Describe your efforts to promote financially feasible and environmentally acceptable Federal hydroelectric projects.

Mr. Shafer. Southwestern views our role as facilitating rather than promoting the development of Hydroelectric power projects. We have developed policies and procedures to facilitate the development of both Federal and non-Federal hydroelectric power projects. As generally provided by the Water Resources Development Act of 1986, Southwestern conducts financial feasibility and marketability analyses as a basis for determining its support of a recommendation for Federal authorization of a hydroelectric power project. As requested by non-Federal interests, Southwestern also conducts studies to determine whether operating arrangements or other services can be provided to facilitate the development of projects licensed by the Federal Energy Regulatory Commission.

RETIREMENT OF DEBT

Mr. Bevill. What was the amount of the payment to Treasury to retire debt in FY 1989?

Mr. Shafer. Southwestern repaid $22.8 million of its repayable investment in FY 1989.

Mr. Bevill. What was the total indebtedness at the end of FY 1989?

Mr. Shafer. At the end of FY 1989, Southwestern had a total repayable investment in completed plant of $895.7 million. At that point $709 million of the total investment remained unpaid.

CALIFORNIA-OREGON TRANSMISSION PROJECT

Mr. Bevill. What is the status of the California-Oregon Transmission Project?

Mr. Clagett. Most preconstruction activities on the COTP have been completed and contracts have been issued by the Transmission Agency of Northern California for construction management services and some of the initial construction materials. The Transmission Agency of Northern California has also released for bid all of the material supply and construction specifications for the Captain Jack to Olinda and Tracy to Tesla segments of the Project. Western has initiated the procurement process for rerouting our existing 230-kV lines around the substation sites, for major substation equipment, and for construction services for the Olinda to Tracy segment of the Project.

The Project Participation Agreement is in the final stages of negotiation and is expected to be signed before any major construction awards are made in the May-June 1990 timeframe.

The three investor-owned utilities have been unsuccessful to date in obtaining approval to participate in the Project from the California Public Utilities Commission. After completion of a joint IOU-CPUC economic study, the IOUs are planning to refile an application with the CPUC in May 1990.

Execution of the Project Participation Agreement (PPA) and establishment of the necessary funding arrangements are the only issues impeding the progress of the California portion of the COTP. The Transmission Agency of Northern

California indicates it is planning to proceed with construction, whether or not the IOUs can participate. The Transmission Agency of Northern California has informed us that on February 21, 1990, it approved an internal agreement that authorizes TANC to fund the entire Project. The various governing bodies and the individual TANC members are expected to ratify this agreement by mid-April. Western plans to execute the PPA and Construction Services Agreement in the May/June timeframe.

Mr. Bevill. What is Western's role in this project?

Mr. Clagett. Western is responsible for a number of Project development and construction activities. Western is the lead Federal agency for compliance with the National Environmental Quality Act. Western is also responsible for design, right-of-way acquisition, construction, and construction management of upgrading 170 miles of existing Western 230-kV transmission line to 500-kV, approximately 24 miles of new transmission line between the Sacramento River and the Tracy 500-kV substation site, rerouting existing 230-kV lines in the Olinda and Tracy areas, addition to the Olinda and Tracy substations and construction of the Maxwell substation.

PROPOSED CONTINUING FUND LANGUAGE

Mr. Bevill. For FY 1990, appropriation language was included making the continuing fund available during periods of below-normal generation. Why is this provision being deleted in FY 1991?

Mr. Clagett. The FY 1990 appropriation making the continuing fund available for purchase power expenses during periods of below-normal generation was proposed for deletion in FY 1991 because the FY 1990 language is considered permanent legislation. We believe it is unnecessary to continue including the language in subsequent appropriation acts.

REPLACEMENT HELICOPTER

Mr. Bevill. I understand that Western recently had a helicopter crash. Will Western need to purchase a replacement helicopter in FY 1991?

Mr. Clagett. Yes, Western needs to replace the helicopter that crashed on February 12, 1990, after hitting a 345-kV transmission line while on line patrol. The helicopter is necessary to patrol and maintain approximately 4,000 circuit miles of transmission lines, microwave relays, and power substations in parts of South Dakota, Nebraska, Iowa, and Minnesota. Many of these locations are not readily accessible by ground vehicles. A helicopter has a decided advantage over fixed wing aircraft in terms of better observation capabilities and the ability to land along transmission lines and at radio repeater, microwave, and substation sites. A purchase-versus-lease study is being performed to determine the most cost effective method of acquisition.

CALIFORNIA-OREGON TRANSMISSION PROJECT

Mr. Bevill. Have the three investor-owned utilities involved in the California-Oregon Transmission Project received approval from the California Public Utilities Commission to participate?

Mr. Clagett. The three investor-owned utilities have been unsuccessful in obtaining approval to participate in the Project from the California Public Utilities Commission. After completion of a joint IOU-CPUC economic study, the IOUs are planning to refile an application with the CPUC in May 1990. We are informed by TANC that the participation agreements provide an opportunity for the IOUs to "back out" in the event that regulatory approval is not obtained. The remaining participants, including Western, would acquire any additional capacity made available.

Mr. Bevill. When will construction on the California-Oregon Transmission Project be initiated?

Mr. Clagett. Award of major construction contracts is scheduled to begin in the May-June 1990 timeframe, and construction activities are expected to be well underway by this fall. TANC received bids and initiated negotiations with a contractor for clearing and access for the construction of the Southern Oregon to Olinda portion of the 500-kV Transmission Line. Clearing and access road work is scheduled to begin in mid-May. TANC received bids for the construction of the Southern Oregon to Olinda Transmission Line on March 12, 1990, with a construction award and Notice to Proceed scheduled for August and October 1990, respectively. TANC has also received bids on the major material procurements and anticipates initiating negotiations for contracts in April 1990. Western construction activities will begin with the Notice to Proceed for the 230-kV Transmission Line Reroute installation work scheduled to begin in September 1990. Western has initiated the procurement process for major substation equipment and expects to award contracts by December 1990. Western also expects to issue invitations for bid on the upgrade portion by May, with award in September.

CONSTRUCTION AND REHABILITATION

Mr. Bevill. Please explain the increase in funding for construction and rehabilitation.

Mr. Clagett. Western's FY 1991 construction program increased $13.4 million, or 13 percent above the adjusted FY 1990 budget estimate to provide additional power system capacity and increased system reliability and operation efficiency. About half of the FY 1991 program increase is for design and specification preparation, land and rights activities, and engineering and environmental work for facilities planned in Northern Arizona and New Mexico. These facilities will relieve transmission bottlenecks to transmitting Western and other hydro and coal-fired generation in Colorado and Wyoming to customers in Arizona and California. Other increases involve construction activities with others for work in Arizona, Southern Nevada, and Southern California area on various interties. The interties will allow needed exchanges of power among utilities and allow for sale of power surpluses to Southwest utilities.

CONTINUING EMERGENCY FUND

Mr. Bevill. Please describe the status of the continuing emergency fund established in FY 1986, including annual expenditures for the past three years.

Mr. Clagett. The Emergency Fund Act of June 26, 1948, 43 U.S.C. 503 provides the basic authority for the continuing emergency fund established in FY 1986. The Act defines "unusual or emergency conditions" as meaning ". . . damage to transmission lines; or other physical failures or damage; or acts of

God, or of the public enemy, fires, floods, drought, epidemics, strikes, or freight embargoes; or conditions, causing or threatening to cause interruption in water or power service." In each "unusual or emergency condition," the question is asked if the condition causes or threatens to cause interruption in power service. If so, the continuing emergency fund is used.

Western's annual outlays under this fund for the past 3 fiscal years are as follows: FY 1987 - $126,584; FY 1988 - $0; and FY 1989 - $158,158. FY 1987 outlays reflect the completion of needed repairs on the 230-kV Dawson County-Medora Transmission Line. A portion of this line was destroyed by high winds.

FY 1989 outlays reflect replacement of wood poles and transmission structures destroyed by a tornado on the Mollard-Rugby 115-kV Transmission Line in North Dakota.

In FY 1990, Western received permanent appropriation language to permit Western's Administrator to use the continuing fund on an ongoing basis for purchase power and wheeling expenses during periods of below-normal hydropower generation. It is possible that some purchased power expenses may need to be funded through the continuing fund in FY 1990 and FY 1991 because hydropower generation is below normal as a result of the drought.

STATUS OF MAJOR LITIGATION

Mr. Bevill. What is the status of major litigation involving WAPA?

Mr. Clagett. I would like to provide that information for the record.

(The information follows:)

National Wildlife Federation v. Western. In February 1989, Western sought permission to execute its Post-1989 power contracts for the Salt Lake City Area Integrated Projects. NWF sought an injunction to halt the execution of the contracts. Judge Greene ruled in Western's favor, authorizing Western to execute the contracts with a "reopener" clause permitting Western to modify contract power allocations based on certain conditions. Those conditions included any subsequent decisions which might arise in the NWF lawsuit, as well as any decisions arising out of any environmental impact statement (EIS) that might be prepared by Western on its Post-1989 Criteria, or arising out of a Department of the Interior EIS on operations at Glen Canyon Dam. By mid-April 1989, Western had executed all 81 Post-1989 contracts.

Western announced that it would prepare an EIS on the Post-1989 Marketing Criteria in September 1989, citing four reasons: the decision of the Secretary of the Interior to prepare an EIS on Glen Canyon Dam operations; the better use of resources in preparing an EIS, as opposed to continuing with time-consuming and costly litigation; the public controversy surrounding Glen Canyon operations; and the EIS would provide Western with additional data on water and power operations. Judge Greene then held a hearing on NWF's motion for a permanent injunction to halt the Post-1989 contracts. Judge Greene issued an Order temporarily suspending the Post-1989 Contracts and Marketing Criteria until Western prepared an interim power marketing plan. The plan, approved by the Court on November 6, put the Post-1989 Criteria and contracts into effect on December 1, 1989. Pending completion of Western's EIS, however, allocations under the contracts are reduced slightly to reflect the amount of power sold by Western on September 29, 1989. Under the plan, Western has the right to revise the Post-1989 power contracts based on decisions arising out of its EIS, or on decisions arising out of the Department of the Interior's EIS or the Recovery Implementation Program for Endangered Species on the Colorado River. The NWF has filed a motion for $306,000 in attorney's fees. Judge Greene will hear oral arguments on the motion on April 12, 1990.

Western v. PGandE, NCPA, et al. On June 8, 1989, Judge William Schwarzer of the U.S. District Court in San Francisco issued his decision in this lawsuit. The case involved a dispute between the parties over Western's authority to sell surplus energy to preference customers in Northern California. The judge ruled that Western has a broad grant of Congressional authority to make such sales, and that the Western-PGandE master contract (Contract -2948A) does not prohibit such sales. Further, PGandE was obligated under its Stanislaus Commitments to provide wheeling to move the energy from Western's transmission system to the preference customers. The judge found that Western and its customers are third-party beneficiaries to the Stanislaus Commitments. Further, Judge Schwarzer ruled that 3 of the 6 preference customers could not have taken the surplus energy during the contract period, since those three cities had all-requirements electric service contracts with PGandE. As a result, Western sold that energy to PGandE during the May-September 1982 period and is entitled to payment from PGandE for that sale, as well as a credit from PGandE for Northwest capacity Western imports into northern California. The judge ruled that PGandE had underbilled Western for capacity sales during 1985-1987. Judge Schwarzer dismissed PGandE's request that the court set the level of Project Dependable

Capacity of Western's Central Valley Project, since PGandE's claim presented no case or controversy. Attorneys for all parties are attempting to reach agreement on the form of a proposed Order in the case. Counsel for PGandE have indicated that they will appeal the decision to the Ninth Circuit.

Santa Clara v. United States. On February 9, 1990, Judge Conti set August 20, 1990, as the date for an evidentiary hearing in this case. At issue is the meaning of the word "nonwithdrawable" in the Santa Clara settlement.

Background: The Santa Clara lawsuit was filed initially in 1975, when the City of Santa Clara, California, filed suit against the Bureau of Reclamation for allegedly selling preference power to Pacific Gas and Electric Company, a non-preference entity, in violation of Reclamation law. After several court decisions, a settlement was negotiated among the parties in 1981. Under the settlement, Santa Clara and several other preference customers were allocated additional firm power, and PGandE agreed to support Western's allocation of an additional 102 megawatts of power.

In 1985, Santa Clara, Palo Alto, Roseville, Redding, Biggs, Gridley, and the Plumas-Sierra REC filed suit against Western, claiming that the Santa Clara settlement granted them a contract right to nonwithdrawable power. In other words, these CVP preference customers claimed that Western could not, under any circumstances, withdraw power from any of them. Western's position is that the power is withdrawable under certain conditions, and that Western never gave up this right in the Santa Clara settlement. After 4 1/2 years of litigation, we are now at the point of an evidentiary hearing which will permit all sides to present testimony on the meaning of the word nonwithdrawable in the Santa Clara settlement.

McAllister v. United States The claim arises out of an automobile accident involving a Western employee driving a government vehicle. Settlement discussions are underway.

STAFFING REDUCTION

Mr. Bevill. What will be the impact on Western if its FY 1991 staffing allowance remains at 1,300 full-time equivalent (FTE), a reduction of 6 percent from the current level?

Mr. Clagett. The impact on Western if its FY 1991 staffing allowance remains at 1300 FTE would be a reduction in the Federal staffs assigned to our contracts and rates, environmental planning and compliance, administration, and engineering functions. We would ensure that our highest priority activity -- operation of the power transmission system -- remains under Federal control. Western would use attrition and early retirements to achieve as much of the reduction as possible.

The FY 1991 staffing allowance was developed by the Administration based on the Department of Energy's overall staffing priorities, and the Administration's interest in controlling total Federal employment. Western has initiated a comprehensive review to determine the most cost-effective mix of its Federal versus contractor staff. (Western's FY 1990 program is being conducted by 1383 Federal FTE and 1,056 contractor FTE.) The study will focus on the relative costs of using Federal employees versus contractor employees to accomplish Western's mission. The results of this analysis will be finalized shortly and discussed within the Administration during its deliberations over the FY 1990 Mid-session Review and the FY 1992 President's Budget Request. In addition, Western's staffing levels will be subject to a rigorous review as part of Department of Energy's Manpower Survey Project, which began recently.

IMPACT OF DROUGHT

Mr. Bevill. The drought in the Western United States has impacted local economies. What impact is it having on Western and its customers? How might continued drought conditions affect future year budget requests?

Mr. Clagett. The drought impacts our hydrogeneration capability, meaning we may have to buy additional thermal power on the open market at a higher cost than power produced by hydrogeneration. Many utilities typically pass this cost on in the form of a fuel adjustment charge. In FY 1989, Western purchased 8.3 billion killowatthours of electricity, the largest in Western's history. If drought conditions continue through the remainder of FY 1990, estimated power purchases could equal or exceed FY 1989. If drought conditions continue through the remainder of FY 1990, estimated power purchases could equal or exceed FY 1989. Fortunately, based on the condition of surplus generation in Western's service area, non-Federal power generation capabilities should be sufficient to allow Western to make increased purchases. We are still assessing the budgetary impact of power purchases this year. Even if the drought were to end today, it would take several years for the reservoirs to return to levels which support normal generation.

RESERVOIR STORAGE LEVELS

Mr. Bevill. What are the current and projected reservoir storage levels?

Mr. Clagett. As of February 28, 1990, reservoir storage levels stood at 98.2 million acre-feet. In an average year there would be 119 million acre-feet of storage. Projections through September 30, 1990, put the level at 94.6 million acre-feet, about a 4-percent decrease from the February 28 levels and about 80 percent of an average year.

COLORADO RIVER STORAGE PROJECT

Mr. Bevill. What are the current conditions for the Colorado River Storage Project?

Mr. Clagett. The Colorado River Storage Project is in its third consecutive year of significantly below-average water availability in FY 1990, requiring power purchases from non-CRSP resources to meet contractual obligations. At the end of FY 1989 all CRSP reservoirs were less than 92 percent of their average level for this time of year. It is estimated that it would take until FY 1993 to refill the CRSP's reservoirs, even if FY 1991 and FY 1992 were to produce average water years. Accordingly, costs for purchased power are expected to remain relatively high through FY 1991. I will supply for the record a table by river basin.

(The table follows:)

	Millons of Acre-Feet			
River Basins	Current Storage As of 2-28-90	Projected Storage As of 9-3-90	Increase or Decrease	Percentage Change
Sacramento-San Joaquin Rivers	4.9	3.0	-1.9	-39%
Colorado River	47.1	44.9	-2.2	- 5%
Missouri River	46.2	46.7	+0.5	+ 1%
Total	98.2	94.6	-3.6	-3.7%

GLEN CANYON ENVIRONMENTAL ACTIVITIES

Mr. Bevill. What is the possible budget impact as a result of the Glen Canyon Environmental activities?

Mr. Clagett. Changes in the dam's water release patterns as a result of environmental activities could adversely affect Western's power customers and our purchase power budget. A Western study concluded that, during adverse water conditions, increasing the minimum river flow levels below Glen Canyon Dam could reduce hydroelectrical power generation and result in increased annual power purchase expenses of as much as $17.0 million.

The Glen Canyon Environmental Studies and the environmental impact statement on the operation of Glen Canyon Dam are both funded from Western's power revenues. Western is a participant in the GCES and anticipates a funding request from the Bureau of Reclamation of about $1.5 million for the remainder of FY 1990, and about $3 million in FY 1991 to support this program.

KANSAS TRANSMISSION PROJECT

Mr. Bevill. What is the status of Western's activities regarding transmission improvements and modifications in Western Kansas, now referred to as the Kansas Transmission Project? Explain the need for this project and its funding requirements.

Mr. Clagett. On May 4, 1989, Sunflower Electric Cooperative, Inc. (Sunflower), Golden Spread Electric Cooperative (Golden Spread), and Western signed a memorandum of intent for the construction of a 345/230-kV line from Sunflower's Holcomb Station in Kansas, to Guymon, Oklahoma, and the sale of Sunflower's excess generating capacity to Golden Spread. System studies are being completed to determine the impact of transferring 200 megawatts from Sunflower to Golden Spread with the addition of the proposed line.

Western is participating in the Kansas Transmission Project in order to acquire ownership of 40 megawatts of capacity on Sunflower's 345-kV Transmission Line System in Western Kansas. The capacity is needed to serve Western's Kansas customers. Western is currently wheeling the 40 megawatts through Sunflower's 345-kV system. The Kansas Transmission Project, as currently proposed, consists of 110 miles of 345-kV transmission line from Holcomb Switchyard, Holcomb, Kansas, to the Guymon Substation, Guymon, Oklahoma. This transmission line would enable Sunflower and Golden Spread to effect power transfers between their respective service areas in Kansas, Oklahoma, and Texas. The total cost of the transmission line is estimated at $36.9 million, of which Western will contribute $15.5 million. Western's cost share was based upon the equivalent cost of continued wheeling, operation, and maintenance charges under the existing 20-year contract with Sunflower.

TOXIC AND HAZARDOUS WASTE

Mr. Bevill. Western states that it is committed to a clean, environmentally safe future. What is the status of Western's cleanup activities in the area of toxic and hazardous waste?

Mr. Clagett. Western has spent approximately $2.0 million for cleanup activities in FY 1989. This includes removal of PCB equipment, liquids, and solids at 28 facilities; and cleanup and removal of approximately 2 million pounds of PCB contamination at Flagstaff Substation. In the previous years, approximately 5 million pounds of PCB equipment, liquids, and solids have been removed from facilities throughout Western.

Mr. Bevill. What work still needs to be done in this area?

Mr. Clagett. The work level for cleanup activities cannot be estimated at this time given the current limited evaluation of Western's facilities. Western has approximately 800 facility locations which are potentially regulated, and must be evaluated. Cleanup plans, schedules, and budgets will be developed as evaluation results are received.

Mr. Bevill. What is projected in FY 1990 and FY 1991 for toxic and hazardous waste site cleanup?

Mr. Clagett. Western projects approximately $5.0 million will be spent in FY

1990 for environmental cleanup. This includes about $4.0 million for removal and replacement of PCB contaminated equipment and soil, asbestos removal, and spill containment system construction. An additional $1.0 million will be spent for assessments, facility investigations and inventory, response equipment, and personnel training.

Western projects approximately $5.0 million will be spent in FY 1991 for environmental cleanup. This includes about $3.5 million for cleanup of facilities and $1.5 million for assessment work.

Mr. Bevill. What do you estimate the total cleanup cost to be?

Mr. Clagett. Total cleanup cost cannot be estimated at this time, given the current status of evaluation of facilities. As evaluations of facilities are completed over the next several years, cleanup plans and costs will be determined.

Mr. Bevill. In FY 1990, the Committee provided Western the authority to use the continuing fund for purchase of power during periods of below-normal hydrogeneration. Has Western used this authority? What have been the results?

Mr. Clagett. No sir, to date Western has not used this authority. It is possible Western will use this authority in FY 1990, as we refine our estimates for financing power purchases.

STATUS OF REPAYMENT

Mr. Bevill. What was the amount of the payment to the Treasury to retire debt in FY 1989?

Mr. Clagett. Western repaid $23.0 million in FY 1989 to retire debt.

Mr. Bevill. What was the total indebtedness at the end of FY 1989?

Mr. Clagett. The total indebtedness at the end of FY 1989 is $2.9 billion. To date, Western has repaid $2.1 billion or approximately 42.6 percent of the $5.0 billion Federal investment.

THIRD AC PARTICIPATION BY NORTHWEST UTILITIES

Mr. Myers. For FY 91, the Administration's budget reflects reductions in BPA's planned borrowing for the Third AC expansion of the Intertie due to the Administration's assumption that two-thirds of the costs, including construction, ownership, operation and maintenance, would be financed by non-Federal participants. Testimony before this subcommittee in previous years indicated that at least two Washington based utilities were interested in helping to pay the cost of the project in return for participation. Is that still the case?

Mr. Jura. Yes. At least two Washington utilities, Puget Sound Power & Light Company (Puget) and Seattle City Light (Seattle), have expressed interest in participating with BPA and the two other current non-Federal owners of the existing AC Intertie, Portland General Electric and Pacific Power & Light, in the expansion of the AC Intertie.

Mr. Myers. What is the status of BPA's negotiations with those utilities? When is an accord expected to be reached?

Mr. Jura. Both Puget and Seattle are actively involved in BPA's rate case to establish a pricing methodology for the non-Federal participation option that continues Federal ownership. That rate case is currently underway and will be completed in mid-May 1990. The record of the rate case will then be filed with the Federal Energy Regulatory Commission for its action on the proposed pricing methodology. The pricing methodology, if approved by FERC, would be the basis for the price any participants would pay BPA for use of the Third AC Intertie under this option.

Puget and Seattle, and possibly other utilities, are also interested in full ownership of a portion of the Third AC Intertie. BPA will analyze an ownership option along with non-Federal participation options in its environmental impact statement on non-Federal participation in the Third AC Intertie.

EFFECT OF COLD WEATHER ON BPA'S TRANSMISSION AND GENERATION SYSTEMS

Mr. Myers. What effect did the extreme cold weather experienced by much of the nation last December have on BPA's transmission and generation capabilities?

Mr. Jura. The extreme cold weather experienced by much of the nation did not extend into our region. In fact, the average temperature at our three major load centers, Portland, Seattle, and Spokane, was 1.2 degrees Fahrenheit above normal for December 1989. The average temperature over the December, January, February period was the warmest since 1982.

BPA's transmission and generating capabilities were not adversely affected during the month of December 1989. We did, however, experience extreme cold weather in February 1989 which affected our system.

In February 1989 the Western United States and Canada experienced abnormally cold weather. The temperature in the BPA service area hit 27 degrees Fahrenheit below normal and new peak system load records were set. Most utility systems in the Northwest reached all time peaks. The effect was heavy loading and stress on the Northwest generation and transmission systems.

The cold weather resulted in air leaks on compressor systems and circuit breaker problems, especially east of the Cascades and in Montana. Extreme cold caused gas pressure in circuit breakers to fall below normal operating levels, and at Garrison, Montana, the gas was liquefying. This limited east to west transfers from Colstrip at times. Transfer limits, coupled with a possible line or generation outage, caused the potential for low voltage problems in the Seattle area during the tighest period. However, such a situation never arose. During the cold weather BPA restricted the upper quarter of all Direct Service Industrial (DSI) load because of energy deficiencies. This represented 580 megawatts of load but the DSI's chose to purchase 440 megawatts of replacement energy. While this nonfirm load was restricted, we were never in danger of not meeting our firm loads.

Because of the lessons learned from the February 1989 cold weather, equipment was modified at Garrison to operate safely at -40 degrees Fahrenheit. Voltage stability studies were run for the Seattle area and a procedure was put in place for abnormally cold weather operation. The procedure was a coordinated Northwest Power Pool (NWPP) procedure that was agreed to by BPA and the other utilities that serve the Seattle area. BPA installed an interruptible load tripping scheme that would preserve non-interruptible load if a 500-kV line is lost during abnormally cold weather. We were prepared, but the BPA service area did not experience abnormally cold weather last winter. For next winter the NWPP procedure is being fine-tuned and capacitors are being added in the Seattle area to improve voltage support.

The effects of the cold weather demonstrated the importance of generation and conservation in meeting the growing power needs of the Northwest. It was directly observed that conservation measures provided increased savings during the colder weather. The fact that conservation measures performed as they did assisted in meeting BPA's need for firm capacity and avoiding additional purchases. Conservation provided a cushion which helped assure system reliability during the cold weather and should continue to be an important component of the Northwest's resource package.

The effect of the cold weather helped to illustrate the importance of resource planning, not just for conservation but for other resources as well. BPA's Resource Program also anticipates the need for additional conservation and generation in the future; it is essential that these measures be pursued in order that the region's power needs continue to be met under various conditions, hot or cold.

Long-term measures are being taken to correct the problems associated with heavy loading and stress on the Northwest generating and transmission systems. System studies reveal that there is the potential for several critical outages on the BPA Main Grid 500-kV system into the Puget Sound area that can cause voltages to collapse and loss of a major amount of load in that area during cold weather periods. In addition, loss of major generation in the Puget Sound or Portland load areas during cold weather could cause voltages to collapse in the Puget Sound area and extend south to Portland. Substantial reactive additions and control measures for voltage support are required in the Puget Sound and Portland areas in the early 1990's to deal with the long-term requirements and provide a permanent fix to the voltage stability problems in the area.

In addition, other options are being studied to [illegible]nforce the Puget Sound load area by the mid-1990's. These options include construction of a new major transmission line extending from the mid-Columbia generation area to the Puget Sound load area, implementation of various conservation measures, employment of new generation resources in the Puget Sound area, load curtailment, and load management. An EIS process and a thorough investigation of all options must be completed before a final decision can be made, selecting the option or combination of options that will actually be implemented.

BEST AVAILABLE COPY

SOUTHEASTERN POWER ADMINISTRATION

SALE OF SEPA ASSETS

Mr. Myers. Explain the rationale for the sale of only a portion, the Georgia-Alabama system, of the Southeastern Power Administration.

Mr. McAllister. A customer group in Georgia representing 48 municipal preference customers has expressed interest in purchasing the marketing rights to the Georgia-Alabama System.

DEVELOPMENT OF POWER PLANTS

Mr. Myers. Describe Southeastern's role in the development of hydroelectric power plants.

Mr. McAllister. Southeastern works with the Corps of Engineers in developing hydroelectric power plants. During the planning stage the Corps prepares a feasibility study. As a part of that study Southeastern evaluates the financial feasibility of the project and provides an opinion on the marketability of the power. In recent years Southeastern has become an integral part of finding sponsors who are willing to provide up-front financing for potential hydroelectric projects.

DURATION OF BENEFITS FROM NON-FEDERAL PARTICIPATION IN THIRD AC

Mr. Fazio. Why are the "non-Federal participation benefits" only to last 26 years, until 2016? Why not the full life of the facilities, which would be at least twice 26 years, and why not indefinitely as the line is repaired?

Mr. Jura. The Intertie Agreement between Pacific Power & Light and BPA terminates on December 31, 2016. That Agreement gives BPA rights to use certain Pacific Power & Light facilities in Southern Oregon that are required to operate the AC Intertie at 4800 megawatts. It is uncertain what rights will be negotiated between BPA and Pacific Power & Light regarding the use of those facilities after 2016. Therefore, BPA can offer no certainty to participants as to the nature of the Third AC Intertie capacity after 2016.

If BPA obtains scheduling rights from PP&L after 2016 for the capacity between 4000 megawatts and 4800 megawatts, then BPA may offer participants a limited, conditional option to participate after 2016. The rate for post-2016 participation would be determined in a rate proceeding at that time.

RATE INCREASE

Mr. Chapman. Mr. Shafer, you note in your testimony (p. 5) the need for a 15 percent system rate increase. Could you provide in more detail the causes which have made this increase necessary?

Mr. Shafer. The need for a 15 percent rate increase on Southwestern's integrated system is primarily due to increasing operations and maintenance (O&M) costs. Increases in the U. S. Army Corps of Engineers' project O&M costs make up about 11 percent. Increases in Southwestern's transmission system O&M costs represent approximately two percent. The remaining two percent is the result of increases in the investment repayable at the Harry S. Truman project.

W. D. MAYO LOCK AND DAM

Mr. Chapman. Is there a possibility of a renewal of negotiations with the Cherokee Nation regarding the development of the W. D. Mayo Lock and Dam?

Mr. Shafer. Yes. Southwestern has indicated its willingness to consider alternative proposals by the Cherokee Nation for the development of the W. D. Mayo Lock and Dam hydroelectric power project (Mayo Project). The Cherokee Nation is currently evaluating other development options.

SUFFICIENT FUNDING

Mr. Chapman. Is the $14,991,000 request for Operations and Maintenance for SWPA sufficient to ensure efficiency and reliability throughout the system?

Mr. Shafer. Southwestern's FY 1991 Operations & Maintenance Budget is $17,516,000. The Budget Resources are made up as follows:

New Budget Authority	$14,991,000
Use of Prior Year Funds	$ 2,325,000
Reimbursable Funds	$ 200,000
	$17,516,000

Southwestern's Operation & Maintenance Request, combined with the requested funding for Purchase Power & Wheeling, and Construction are sufficient to ensure efficiency and reliability throughout the system.

POWER POOLING

Mr. Chapman. Please explain the $0 request for Power Pooling Arrangements.

Mr. Shafer. No funds are requested in the FY 1991 Budget for Power Pooling Arrangements since adequate funding of $1,000,000 was obtained for that purpose through FY 1990 appropriations.

ROBERT DOUGLAS WILLIS HYDROPOWER PROJECT

Mr. Chapman. Is the Robert Douglas Willis Hydropower Project (placed in service in December 1989) operating at full power generation? If not, what is the schedule for full operation?

Mr. Shafer. Yes. The project is currently operating at full power generation.

DENISON DAM PROJECT

Mr. Chapman. What concerns or conflicts have yet to be resolved with regard to the Denison Dam project and Lake Texoma?

Mr. Shafer. The members of the Lake Texoma Advisory Committee, formed under provisions of PL 100-71, have made significant progress toward resolving the conflicts regarding the Denison Dam/Lake Texoma project. The Advisory Committee has completed a report outlining the desires and needs of the various interest groups regarding operation of the project. The principal unresolved issues include (1) formulation of an acceptable seasonal lake level manipulation plan, (2) water supply storage pricing policies, (3) completion of the report evaluating the feasibility for additional hydroelectric power development, (4) possible revision in project operating procedures to mitigate downstream bank erosion, and (5) reexamination of the project cost allocation to reflect the relative benefits of authorized project purposes.

Statement of J. Michael Davis
Assistant Secretary for Conservation and Renewable Energy
Department of Energy
FY 1991 Appropriations Hearing

Mr. Chairman and Members of the Subcommittee, I am pleased to be here with the five Power Marketing Administrators to present their budget requests for FY 1991.

First, let me introduce my colleagues: Robert J. Cross, Administrator of the Alaska Power Administration; James Jura, Administrator of the Bonneville Power Administration; John A. McAllister, Jr., Administrator of the Southeastern Power Administration; J.M. Shafer, Administrator of the Southwestern Power Administration; and William Clagett, Administrator of the Western Area Power Administration. Each of the administrators will speak to the budget needs of his own agency.

The President's FY 1991 budget proposes legislation now being finalized in the Executive Branch which would modify the repayment practices of four of the five Power Marketing Administrations, or PMAs. The PMAs generate and sell six percent of the country's electric power. They are major Government businesses with annual power sales of about $2.8 billion. It is highly appropriate that the PMAs repay the federally financed investment on a regular, business-like basis. The President proposes to modify the repayment practices of the PMAs by placing them on a straight-line repayment schedule and adjusting the interest rates on all outstanding investments from the existing original project rates, to current market rates utilities now pay. Also included are the investments in irrigation features of reclamation projects that are funded from the power receipts of the PMAs. In addition to placing the PMA repayment practices on a more sound footing, these reforms are projected to produce additional Federal revenues and therefore reduce the budget deficit by about $966 million in FY 1991.

The President's FY 1991 budget also assumes completion of the sale of the Alaska Power Administration, and anticipates the sale of the Georgia-Alabama system within the Southeastern Power Administration to existing customer groups.

Mr. Chairman, that completes my testimony. Each of the Administrators has a statement on his budget request. We would be glad to answer any questions you may have.

Statement of Robert J. Cross
Administrator
Alaska Power Administration
Department of Energy
FY 1991 Appropriations Hearings

The Alaska Power Administration (APA) is requesting new budget authority and appropriations of $3,233,000 for FY 1991.

The request would continue adequate funding for APA's operations, maintenance, transmission, and power marketing programs for the Eklutna and Snettisham hydroelectric projects, pending completion of the proposed APA divestiture.

ALASKA POWER ADMINISTRATION PROGRAMS

APA is responsible for operation, maintenance, transmission, and power marketing for the Eklutna and Snettisham hydroelectric projects. Eklutna is a 30-Megawatt (MW) installation providing roughly five percent of the power used in Anchorage and the surrounding areas. Snettisham is a 78 MW installation and the main power source for Juneau, Alaska's capital city.

At Snettisham, the 31 MW Crater Lake unit has been in essentially continuous operation since early November, 1989, at which time APA assumed operating responsibilities. The Corps of Engineers expects to complete all construction activities in the new unit in 1991. Significant remaining work items for the Corps include a new Supervisory Control System, modifications to transmission system, and trashrack installation.

APA has a staffing authorization of 35 FTE with half of the positions in our Juneau Headquarters office and the balance stationed at the two project sites.

Within DOE, APA reports to the Assistant Secretary for Conservation and Renewable Energy.

Each project has its own authorizing legislation providing guidance for power marketing and repayment; and providing authority for managing and operating the projects.

Eklutna and Snettisham were authorized and developed as essentially single-purpose power projects. However, important developments have occurred for fisheries enhancement, public recreation, and municipal water supply with non-federal interests covering investment and operation costs.

FUNDING AND REVENUE LEVELS

APA's annual funding requirements remain essentially level, the FY 1991 budget request of $3,233,000 is three percent above the FY 1990 and one percent below the FY 1989 program.

The emergency funds appropriated in FY 1984 of $200,000 remain intact, along with APA's commitment not to draw on these funds unless it becomes absolutely necessary.

FY 1989 revenues were just over $9 million. We expect increased revenues in FY 1990 given high reservoir levels at Eklutna and increased capacity at Snettisham. Revenues will be about $9.6 million for FY 1991.

Portions of APA work is carried out under contract by customer utilities with net billing arrangements for payment. The work consists of maintenance of transmission lines at Eklutna, and operation and monitoring by supervisory control at both Eklutna and Snettisham. Total net-billed payments for FY 1991 are estimated at $293,000, less than 3% of revenues.

REPAYMENT PROGRESS

For FY 1989, revenues covered annual costs with $6.3 million applied to interest and principal payments. We expect continued satisfactory repayment progress in FY 1990 and 1991.

FY 1990 ACCOMPLISHMENTS

APA reports continued satisfactory progress on the preventive maintenance and inspection programs.

A series of comparatively small replacements and improvements are complete or scheduled for completion in FY 1990. The largest single item is installation of new 115kV circuit breakers at the Eklutna Powerplant.

Two sizeable items at Eklutna remain in deferred status: installation of a replacement turbine runner and the generator rewind program. In each case, deferral is based on favorable inspection results indicating useful life of the original components can be extended.

At Snettisham, activities continue to focus on the new Crater Lake unit. In cooperation with a customer utility, APA installed a temporary Supervisory Control System for unit operation and monitoring pending installation in 1991 of the permanent system.

Work with the Corps in correction of construction deficiencies and testing and trouble-shooting of the new systems will continue through the year.

APA plans to begin overhaul of the older Long Lake units have been deferred to 1991 to accommodate scheduled 1990 work on the Crater Lake components.

APA's environmental work needs improvement. We've made good progress on inventory and labeling of hazardous materials and on disposal of hazardous wastes. In 1990, we are beginning work on more formalized environmental management plans, including such things as oil containment facilities at the switchyards and substations.

FY 1991 REQUEST

The FY 1991 request provides adequate funds to continue the full range of APA's work. Emphasis would continue on the preventive maintenance and inspection work needed to sustain facilities in excellent condition; and cooperation with the Corps to close out their construction activities for Crater Lake.

As indicated in the justifications, several fairly small replacement and improvement items are proposed, including improvements in oil containment which will reduce risk to environmental damages and cleanup costs in the event of spills.

DIVESTITURE

As reported last year, a purchase agreement for sale of the Snettisham Project to the State of Alaska was signed in February, 1989. A similar agreement for sale of Eklutna to its three utility customers was signed in August, 1989. Legislation which would authorize sale of the two projects in accordance with the purchase agreements has been drafted and is under review within the Administration. We expect the legislative proposal will be ready for Congressional consideration shortly.

The budget assumes that sale authorization will be obtained and the sales completed by the end of FY 1991, with sale proceeds of $85 million.

APA will be prepared to initiate specific transition plans as soon as Congressional authorization of the divestiture is obtained. In the meantime, our FY 1991 request will assure capability to continue APA's program for the full year.

Statement of James J. Jura
Administrator
Bonneville Power Administration
FY 1991 Appropriations Hearings

Mr. Chairman and Members of the Committee, it is a pleasure to come before you to present the fiscal year (FY) 1991 Budget for the Bonneville Power Administration (BPA). First, I would like to take a few minutes to tell you about our current financial situation before discussing our budget and program activities.

CURRENT FINANCIAL STATUS - SUMMARY

I am pleased to report that for the sixth straight year we have made our planned payments to the U.S. Treasury in full. In making our FY 1989 Treasury payment of $606 million, BPA boosted its total principal and interest payments to $6.4 billion. Of these payments, $4.9 billion has been interest, and $1.5 billion has been principal repayment. More than $4 billion, or 66 percent, of the total $6.4 billion has been paid during the last 10 years. Since the early 1940's when BPA first began to incur this debt, 15 percent of the outstanding principal has been repaid.

BPA finished FY 1989 with net revenues of $40 million. During FY 1989, we experienced the third consecutive low water year coupled with an extremely cold February. These events put us in a short-term power squeeze, forcing us to spend $93 million for power purchases from outside sources in order to meet our customer commitments and protect Federal reservoir levels. Despite these unexpected costs, our FY 1989 obligations were up less than $3 million over 1988 actuals. Finishing the year in the black can be attributed to the healthy aluminum market, a strong Northwest economy, efficient operation of the transmission system, and cost discipline within BPA.

Revenues collected by BPA from the aluminum industry are expected to decrease this year and net revenues are uncertain. However, preliminary reviews of our expected FY 1990 results make us confident that we will fully meet our FY 1990 Treasury payments.

Spot aluminum prices on the world market have fallen 33 percent from what they were when I last addressed this Committee -- from 98 cents/lb. in March of last year to 65 cents/lb. in February of this year. BPA sells power to the aluminum industry at a variable industrial rate that is tied to the world price of aluminum. This rate is designed to keep Pacific Northwest regional aluminum smelters operating during periods of low aluminum prices, such as we are now experiencing. The variable rate likely will reach the lower rate limit of 16.2 mills per kilowatthour in May of this year, due to the current slump in aluminum prices. Last year at this time, the variable rate was 28.8 mills per kilowatthour (the upper limit), and it continued through 1989 at that high level. Although aluminum prices have dropped, industry loads have remained at levels as high or higher than last year. The lower rate, despite the strong demand, could reduce our revenues for this year by as much as $135 million over what the 28.8 mill rate for the full year would provide. On the positive side, recent precipitation has added substantially to the runoff we expect this spring. Although dry weather over the next couple of months could temper our optimism, we now estimate that the volume of runoff will exceed 90 percent of average and that reservoirs will refill. These favorable water expectations have allowed us to resume discretionary sales of surplus energy to California.

While we have been successful recently in keeping rates stable and meeting our repayment commitments, we need to rebuild our cash position and reduce our high level of fixed costs. With our revenues subject to large swings, a better cash position and lower fixed costs will give us the flexibility we need to keep rates stable and repay the Treasury on schedule when revenue shortfalls occur.

The adequacy of our wholesale power rates will be reviewed later this year. Given our customers' growing demand for energy, we are looking at the need for acquiring resources and for reinforcing our transmission system at critical points. Increased load, coupled with potential fluctuations in aluminum revenues over the next few years, will make the task of reducing fixed costs very challenging.

SUPPLY SYSTEM REFINANCING

During 1989, BPA and the Washington Public Power Supply System (Supply System) successfully initiated a refinancing effort in order to take advantage of the current lower interest rates. In total, we expect to refinance over $3 billion of high interest Washington Nuclear Project (WNP) 1, 2, and 3 bonds issued in the late 1970's and early 1980's.

Confident of BPA's business practices, Wall Street issued the Supply System good investment-grade ratings. The ratings (AA-/A) and current market conditions, led to two successful bond sales during 1989. The two sales totaled $1.6 billion, with effective interest rates averaging 7.5 percent. This contrasts with interest rates of 10 to 15 percent on the bonds refunded.

To date, the refunding effort provides BPA an average annual savings of about $50 million a year for the period 1990 through 1998 and about $30 million a year for the period 1999 through 2011. Additional refunding issues are likely in the next few months. When completed, the Supply System bond refinancing effort is expected to reduce BPA's total debt service by an average of $70 to $80 million a year.

LOAD/RESOURCE BALANCE

As this past year has demonstrated, the Northwest no longer has surplus electric energy. Today, BPA's resources roughly equal the demand for electricity from its customers. A strong Northwest economy and loss of some generation from the Hanford Generating Project (HGP) have consumed BPA's long-term surplus. Even under these circumstances, BPA is expected to remain near load/resource balance through the next decade assuming "medium" load growth.

Because of the uncertainty in future load growth, BPA plans to meet a range of possible future load scenarios. Under a medium load growth future, BPA would remain approximately in load/resource balance until the late 1990's. However, there is a 50 percent probability that loads will be higher than forecasted in the medium case. In our draft 1990 Resource Program released to the public for their review and comment on December 13, 1989, BPA is positioning itself to respond to higher load growth should it occur.

In the draft Resource Program, BPA proposes to rely on conservation and generating resources. The proposal includes actions to reduce BPA load requirements through conservation activities by 200 average megawatts (aMW) between 1992 and 1997. During fiscal years 1992-1993, a modest number of generation actions are planned including contracting for 50 aMW through competitive bidding, 100 aMW of hydro and transmission efficiency improvements, and 30 aMW of geothermal output contracted for under a pilot project. The proposal also contains a resource contingency plan to prepare BPA for higher than expected loads. We believe our proposed resource program prepares us to meet future load increases without irrevocably committing BPA to major investments until the need becomes more clear.

Specifically, the proposal for conservation will increase spending on conservation consistent with a least-cost approach during the 1992-1993 time period. Conservation is desirable because it can be brought on in small, manageable increments, is reliable, and is less expensive than most other power resources.

Another major consideration underlying the Resource Program is the focus on potential lost-opportunity resources. The proposal includes programs designed to assure that we obtain access to such resources (low-cost, and lost if not acquired when they become an accessable opportunity).

BPA has worked closely with the Northwest Power Planning Council (Council) towards regionwide adoption of its Model Conservation Standards (MCS). The State of Washington recently adopted a residential MCS building code, which will become effective in 1991, and the State of Oregon is likely to adopt one in 1991 (effective 1992). If all Northwest jurisdictions adopt these residential codes, savings in the range of 100-400 aMW could be achieved by the year 2010.

In the last 2 years, our marketing efforts have been successful. We have signed a 72 MW contract with the cities of Burbank-Glendale-Pasadena, 250 MW with Southern California Edison, and 150 MW with Modesto-Santa Clara-Redding. We also expect to finalize a bilateral transaction and a Firm Displacement transaction involving California utilities for approximately 116 MW in the next month. In total, we will have sold over 500 MW to California utilities. We have also concluded an additional 300 MW sale to Puget Sound Power & Light, and we have marketed surplus firm power within the region under the Partnership program.

BPA is also on the verge of concluding a transaction with Portland General Electric and Portland General Exchange which will be in the range of 500 MW. Lastly, BPA is in the final contract drafting with Pacific Power & Light for a new 20-year capacity contract for over 1000 MW to begin when the current contract expires in late 1991. Thus, BPA will have met its current surplus firm power marketing efforts.

NEW DIRECTIONS

The Pacific Northwest faces major energy choices in the 1990's. After almost a decade of surplus energy, the region has moved into an era of balance between electricity demand and supply. Furthermore, the 1990's will bring new power sales contracts with our customers, new negotiated agreements with Canada over use of the Columbia River, and new opportunities for mutually beneficial energy arrangements with Canada.

Under the terms of the Columbia River Treaty that was ratified in 1964 between the U.S. and Canada, British Columbia Hydro and Power Authority (B.C. Hydro) constructed three Treaty projects in Canada. The storage in these projects increased the usability of power generated at downstream plants in the U.S. One half of this increase, called the Canadian Entitlement (Entitlement), belongs to the British Columbia Government. Initially, the British Columbia Government sold the rights to this Entitlement to a consortium of U.S. parties for a term of 30 years commencing with the completion of the Treaty projects. The Entitlement contracts begin to expire in 1998 and will be fully terminated by 2003.

The obligation to return the Entitlement creates several issues for BPA and other Pacific Northwest (PNW) utilities to address. First, in 2003 the Pacific Northwest Coordination Agreement, which optimizes power generation of the Federal and non-Federal hydroelectric projects, will expire. An agreement will need to be reached on how the PNW system will operate after 2003. Second, the obligation to return the Entitlement will require that U.S. parties agree on an allocation of responsibilities between Federal and non-Federal projects. Third, the U.S. and British Columbia Government must agree on how the Entitlement return will be scheduled and where its return will be the most beneficial to both parties.

BPA is also pursuing other long-term coordination options with BC Hydro that could benefit both the U.S. and BC Hydro systems. Currently, BPA is proposing to negotiate an extended and expanded Non-Treaty Storage Agreement that will accomplish additional coordination of the Columbia River system primarily through the shared use of the existing non-Treaty storage in Mica reservoir. Coordination involving the Peace River system in Canada, which could produce further benefits to the two systems, will be pursued after the Non-Treaty Storage Agreement.

BPA's long-term power sales contracts with its Pacific Northwest (PNW) customers, which were offered pursuant to the 1980 Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act), expire in 2001. BPA will develop contract principles for its direct service industry (DSI) and utility customers within the next 5 years. DSI contract principles will be staged first to accommodate notice deadlines in the existing contracts. Decisions regarding DSI quality of service must be supported by economic and environmental analyses.

BPA, the Bureau of Reclamation, and the Corps of Engineers are initiating a comprehensive system operations review study. The study will review operations of the major Federal Columbia River Power System hydro projects for their multiple authorized purposes.

Extra-regional power sources offer another means of meeting future resource needs. Negotiations are underway with Canada and U.S. utilities in the Inland Southwest and on the West Coast to explore such possibilities. BPA is also working closely with utilities, the Corps of Engineers, the Bureau of Reclamation, and B.C. Hydro to maximize potential benefits from increased coordination of power systems, production and operating efficiencies, and exchanges of power.

THE TRANSMISSION SYSTEM

The Federal transmission system transmits about 75 percent of the bulk power in the Pacific Northwest. It ties all owners' generation to their load centers and allows them to operate their resources in the most economical manner. As the region enters load/resource balance, transmission becomes the critical link to connect with new and, in some cases, nontraditional resources.

Our transmission facilities have served the Pacific Northwest well. Under the Federal Columbia River Transmission System Act of 1974, BPA assures the adequacy of regional transmission capacity to carry BPA's and other utilities' power to serve regional loads. In addition, BPA's interregional intertie capacity is made available to others when not required by BPA.

BPA supplies cost-based firm wheeling to regional utilities, allowing them to integrate very remote resources with their regional load at very low cost. The magnitude of this service is large -- in FY 1989 it exceeded 9000 MW of contract demand. In addition, BPA provided nonfirm transactions to regional utilities in excess of 1000 aMW. BPA also provided substantial intertie transmission services. We integrated 600 aMW from Canada, much of which contributed to the nonfirm transmission of 1100 aMW exported to California.

BPA is pleased to report that implementation of the Long-Term Intertie Access Policy (LTIAP) is proceeding smoothly. BPA has signed contracts which provide 341 MW of long-term firm transmission on BPA's share of the Intertie. Negotiations which may provide up to an additional 500 MW for seasonal exchanges are underway.

In addition, BPA is actively negotiating joint venture arrangements. These include a 50 MW capacity sale with Washington Water Power and the Northern California Power Agency and a firm displacement capacity sale with Portland General Electric and Portland General Exchange in which Portland General Electric would use up to 550 MW of firm Intertie transmission capacity.

BPA completed the first ever firm wheeling from Canada to California last fall. Under the terms of the LTIAP, BPA entered into an agreement which allowed the delivery of firm power from B.C. Hydro to the Sacramento Municipal Utility District. BPA believes this transaction provides an example of the type of power sales transactions which the LTIAP can enable. BPA has also completed several short-term firm Intertie transmission arrangements with Washington Water Power.

With respect to nonfirm transmission, BPA has proposed extending the experimental conditions which were adopted to increase competition in the nonfirm market. BPA has taken this action because low water conditions in the PNW the last 2 years have resulted in relatively little experience in utilizing the allocation procedures which are necessary when nonfirm supply exceeds transmission capacity.

Due to increased power loads, our system is becoming stressed at a number of points and major reinforcements may be needed on the main grid. Construction of new facilities is expected to become more difficult due to increased environmental sensitivity.

Under these circumstances, we are taking several actions. Actions include exploration of alternatives such as demand-side management in lieu of supply-side construction and emphasis on maintaining the existing infrastructure through the development of a comprehensive 10-year maintenance and replacement plan.

ENVIRONMENT

Today, about 91 percent of BPA's average annual power generation is hydroelectric. The fuel, falling water, is renewable, relatively inexpensive, and nonpolluting. The Federal hydro system helps the Northwest avoid burning fossil fuel and, through sales of surplus power to California, has displaced more costly oil- and gas-fired generation. BPA has shipped enough electricity south to save California about 270 million barrels of oil in the last 20 years, or about 37,000 barrels a day. This has prevented up to 2.7 million tons of air pollution that would have resulted from burning this fossil fuel.

Like most American utilities, BPA has polychlorinated biphenyls (PCBs) and traces of other contaminants in the soil at some substations. BPA is committed to cleaning up this contamination. Cleanup work at 19 sites has already been initiated.

In 1989, BPA awarded a contract for a remedial investigation and feasibility study pursuant to CERCLA (Superfund) at its Ross Complex in Vancouver, Washington. BPA is working closely with the State of Washington, local residents, and community leaders to assess this contamination and the most efficient means to remedy it.

In addition to these site cleanup efforts, BPA has underway a number of initiatives aimed at pollution prevention. Among these are: a program to replace its inventory of underground storage tanks; the installation of secondary containment systems at certain high risk facilities to prevent discharges into surface waters; and a major effort to replace equipment containing PCBs systemwide, thereby removing the major source of PCB contamination. BPA's cleanup efforts are paid by revenues received from customers through rates.

BPA's role in environmental matters goes beyond the normal responsibilities of an electric utility. BPA works with the Council and others to protect and enhance fish and wildlife populations that were damaged by Federal dams. In 1989, BPA devoted over $134 million in direct expenditures and foregone revenues to fish and wildlife activities. The foregone revenues are the result of increased river flows, and spill, for fish moving downstream at critical migration times. These activities reduce BPA's ability to generate power and revenues.

THE NORTHWEST POWER ACT - 10 YEARS LATER

1990 is a landmark year for BPA. It marks 10 years since passage of the Pacific Northwest Electric Power Planning and Conservation Act. Since passage of the Act, BPA has worked to assure that adequate, environmentally acceptable, and least-cost power resources are available to Northwest electric energy consumers. Through teamwork with the Council, public and private utilities, State and local governments, Indian tribes, irrigating farmers, businesses, interest groups, and many other regional organizations, BPA has developed a broad base of programs to help meet future energy needs and improve the quality of life in the Pacific Northwest.

Paramount among our actions have been achievements in our conservation, fish and wildlife, and residential exchange programs. From 1981 to 1989, BPA conservation programs have extended BPA's energy supply by nearly 300 aMW -- enough to power a city of 100,000. Through FY 1989, BPA has committed $610 million for that conservation. Another $130 million has been committed in support of the Council's Model Conservation Standards. Building codes in place at the end of FY 1989 will save another 100 to 400 MW, depending on how fast loads grow over the next 20 years.

Through 1990, a total of over $1.7 billion in rate relief will have been absorbed by BPA ratepayers to benefit the Pacific Northwest's residential and small farm electric power consumers under the Residential Exchange Program. Through this program, BPA buys power from each participating utility at that utility's average system cost. BPA then sells the same amount of power back to each utility at BPA's lower, preference-power rates.

Today, BPA funds one of the largest fish enhancement programs in the world. Between fiscal years 1981 and 1989, BPA invested more than $750 million in Columbia River salmon and steelhead. This includes $170 million for projects such as hatcheries, habitat improvement, and the study of diseases that threaten the Northwest's salmon and steelhead.

Since 1981, BPA has foregone an estimated $280 million in revenues as a result of the annual downstream "flush" of juvenile salmon, and over $300 million has been paid to the U.S. Treasury for capital investment and in operation and maintenance of Corps of Engineers fish facilities. During this same period, we have also spent $5 million to restore wildlife, with another $5 million expected to be spent in each of fiscal years 1990 and 1991.

Returns of salmon and steelhead have generally increased since 1980, although 1989 returns were disappointing in that they did not follow this trend. These increases have resulted primarily from changes in ocean harvest of some stocks, and population increases in other stocks. We believe BPA investments in fish passage programs, as well as habitat and artificial production activities, have also contributed to these increases. However, some fish stocks have not done as well. In fact, Federal fishery managers have established an initiative to address conservation and preventive measures for specific depressed populations of Columbia River salmon and steelhead.

Over the past 10 years, BPA, its customers, and the Council have developed a cooperative relationship to carry out the complex responsibilities assigned to each organization.

The Council is charged with developing a long-range regional Power Plan and a Fish and Wildlife Program. BPA relies on the Planning Council's Power Plan and Fish and Wildlife Program to provide the context within which our own specific program and budget planning takes place. This Council guidance helps BPA prioritize its resource analysis, and develop program plans, budgets, and staffing over the near term.

The Council's Power Plan and BPA's Resource Program agree on both the importance of planning flexibility in preparing to meet uncertain future conditions and the need to capture cost-effective lost-opportunity resources. The Council and BPA also have been working together to coordinate the use of planning assumptions and tools, and to enhance the existing resource planning capabilities of both organizations.

FY 1991 BUDGET IN BRIEF

As this Committee is aware, BPA is funded without annual appropriations. Its programs are financed by sales of power and associated services, from reimbursements, and from proceeds of bond sales to the U.S. Treasury. The Federal Columbia River Transmission System Act of 1974 provided BPA with permanent and indefinite authority to finance its programs on a business-like basis from power sales revenues and proceeds from bond sales to the Treasury.

There are no major new initiatives in our FY 1991 budget. Our planned obligations for FY 1991 increase by just 3 percent ($80 million) over budgeted FY 1990 levels. Total obligations of $3,010.9 million and capital transfers will be financed with revenues from customers and from the sale of bonds to the U.S. Treasury.

Through FY 1989, BPA had returned over $8.1 billion to the U.S. Treasury for interest, amortization, and operations and maintenance of the Federal investment in the FCRPS. In FYs 1990 and 1991, we anticipate paying an additional $1.34 billion to the Treasury, of which $779.8 million will be interest, $329.4 million will be applied to principal, and the balance of $228.8 million will cover operation and maintenance of hydroelectric facilities.

At the end of FY 1989, outstanding Federal investment in power (plus irrigation facilities assigned to power) totaled $9.1 billion, and we estimate a slight increase to $9.2 billion by the end of FY 1991.

The President's FY 1991 budget proposes legislation, now being finalized in the Executive Branch, that would modify the Power Marketing Administrations' repayment practices to operate in a more business-like manner. It would put BPA on a fixed straight-line repayment schedule for appropriations and adjust the interest rates on all outstanding appropriations from the original project rates to current market rates. Also included are the irrigation assistance payments that are funded from our power receipts. We estimate that these modificiations would provide the U.S. Treasury with an additional $590.4 million.

Nearly one-third ($930 million) of BPA's FY 1991 obligational authority is earmarked for the Residential Exchange Program. Under this exchange, the estimated net cost of the program to BPA ratepayers in FY 1991 is about $180 million. The 1980 Northwest Power Act established the residential exchange in order to extend the benefits of the Federal power system to all residential and small farm electric power consumers in the Pacific Northwest. The FY 1991 budget also provides $78 million for energy conservation, $53 million in direct expenditures for fish and wildlife, and $176 million for operating and maintaining the transmission system.

CONCLUSION

In conclusion, we continue to operate the Bonneville Power Administration in order to take full advantage of opportunities to increase revenues and lower expenses. With the challenges ahead, it will take the full resources of BPA to achieve our objectives and continue to meet our commitments to this Committee, to our customers, and of course, to the U.S. Treasury.

This concludes my prepared statement. I would be glad to answer questions from the Committee.

Department of Energy
Washington, DC 20585

JOHN A. MCALLISTER, JR.
Administrator
Southeastern Power Administration
U. S. Department of Energy

Biographical Sketch

John A. McAllister, Jr., was appointed Administrator of Southeastern Power Administration November 17, 1989, by Secretary of Energy Admiral James D. Watkins.

Established in 1950, the Southeastern Power Administration (Southeastern) markets Federal hydroelectric power produced at Corps of Engineers' constructed Projects in ten southeastern states. Based in Elberton, Georgia, Southeastern markets power produced at 22 multiple-purpose projects to 297 power purchasers.

Prior to his appointment, Mr. McAllister was a consultant in real estate and investment enterprises in South Carolina and Georgia.

Mr. McAllister received a Bachelor of Science Degree in Business Administration at The Citadel in Charleston, South Carolina in 1980. He was recently elected to The Citadel Board of Visitors by the South Carolina General Assembly. He is also a member of the Army National Guard.

Born in McCormick, South Carolina, Mr. McAllister is married to the former Kitty Armstrong of Frankfort, Kentucky. The couple resides in Greenwood, South Carolina, where he is active in many community organizations.

Statement of John A. McAllister, Jr.
Administrator of Southeastern Power Administration
Department of Energy
Fiscal Year 1991 Appropriations Hearings

Mr. Chairman and Members of the Subcommittee:

It is a pleasure for me to make my first appearance before you today to present the fiscal year 1991 budget request for the Southeastern Power Administration (Southeastern) and to discuss Southeastern's programs. I will summarize the major program areas of the request and discuss some of our accomplishments.

The Southeastern Power Administration, with headquarters in Elberton, Georgia, markets hydroelectric power from projects constructed and operated by the U.S. Army Corps of Engineers located in 10 Southeastern states. Southeastern has no transmission lines and accomplishes the delivery of power by wheeling agreements with power utilities in the area that have the necessary transmission facilities.

Southeastern presently markets power from 22 multiple-purpose projects to 297 power purchasers. Estimated gross revenues including net billings for fiscal year 1991 are $175 million, reflecting the sale of 3,092 megawatts of installed capacity with 7.4 billion kilowatt-hours of energy.

Southeastern's overall repayment status is as follows: from inception in 1950 to September 30, 1989, operating revenues available for repayment totaled $1.7 billion. These revenues were allocated to payment of $805.2 million of annual operating expenses, $608.6 million of interest expense, and $292.8 million of capital investment in electric plant. As of September 30, 1989, the total plant investment of $1.4 billion, the amount to be repaid to the U.S. Treasury, has been reduced to $1.1 billion. Since the 1950's when SEPA began incurring debt 21% has been repaid.

FISCAL YEAR 1991 BUDGET

A funding level of $20.3 million is requested in the President's 1991 Budget to effectively carry out Southeastern's mission. The fiscal year 1991 program level request represents an increase of $1.8 million over the amount appropriated for the current year.

A comparison by activities of the fiscal year 1991 Operation and Maintenance budget request with the amounts available in fiscal year 1990 is as follows:

	FY 1990	FY 1991	Difference
System Operation and Maintenance	$ 2,324,000	$ 2,624,000	+$ 300,000
Purchase Power and Wheeling Charges	16,132,000	17,661,000	+ 1,529,000
Total, Southeastern Power Administration	$18,456,000	$20,285,000	+$1,829,000
Use of Unobligated Balances		-11,000,000	
New Budget Authority Requested		$ 9,285,000	

SYSTEM OPERATION AND MAINTENANCE

The request of $2.6 million for the System Operation and Maintenance activity will provide funds for the negotiation and administration of wheeling and power sales contracts; development and review of rates to assure repayment of power costs; scheduling the generation of power and supervision of power deliveries; and direction and support of Southeastern's power marketing program. This amount represents a $300 thousand increase over the amount available in the current year.

The major portion of the request for this activity provides funding for personnel compensation and related costs and reflects the continuation of the current manpower level of 40 full-time personnel. The request provides for increases resulting from statutory within-grade and Performance Management Recognition System increases, terminal leave payments, additional personnel benefit costs, automated data processing equipment maintenance, and higher costs for support functions.

PURCHASE POWER AND WHEELING

The major portion of the budget request, $18 million, is required for the Purchase Power and Wheeling activity and represents an increase of $1.5 million over the amount available in the current year. The increase is required for payment of transmission services under contractual arrangements.

Funds provided for this activity are used to pay amounts charged the Government under contractual arrangements for (1) delivery of power over non-Federal systems to load centers of preference customers for the account of the Government, (2) purchase by the Government of energy, if necessary, during adverse water periods, and (3) support capacity required to meet commitments for the Jim Woodruff Project under adverse water conditions.

Southeastern does not own or operate transmission facilities. Therefore, Southeastern has contracted with area utilities that have transmission facilities connected to the projects to deliver the power to the preference customers. In most cases, Southeastern agrees to compensate the utility for the transmission service provided. In Georgia, some preference customers compensate these transmission agencies directly. In some minor cases, preference customers arrange their own wheeling.

Contracts providing for the sale of all power to both existing and new preference customers which are expected to be in effect during fiscal year 1991 cover the following Southeastern sales:

1. Power produced in the Georgia-Alabama System which is marketed within the service areas of South Carolina Public Service Authority, South Carolina Electric & Gas company, Duke Power Company, and the operating utilities of the Southern Company (Georgia, Alabama, Gulf, and Mississippi Power Companies).

2. Power produced in the Cumberland System which is wheeled outside the Tennessee Valley Authority (TVA) service area as well as that sold within the TVA service area, and power designated to be marketed in the Kentucky Utilities service area.

3. Power produced in the Kerr-Philpott System which is marketed in the Appalachian Power Company, Virginia Power, and Carolina Power & Light Company service areas.

4. Power produced at the Jim Woodruff Project and sold in the Florida Power Corporation service area.

With respect to the power produced in the Georgia-Alabama System and sold in the Southern Company service area (Georgia, Alabama, Mississippi, and the panhandle of Florida), wheeling charges will be handled, to the extent possible, by net billing with the affected utilities during this period.

Decreasing quantities of capacity will be sold to the operating utilities of the Southern Company through May 1991, and charges to these utilities for this capacity will be used to offset charges for transmission services provided. During fiscal year 1991, increased funding will be required for payment of transmission services under these contractual arrangements, since capacity sales to the Southern Company operating utilities will be insufficient to fully net bill the charges for transmission services provided.

POWER SYSTEMS

Southeastern's projects are grouped for marketing purposes into four independent systems. The power systems, customer locations, and status of wholesale rate adjustments are hereinafter discussed.

GEORGIA-ALABAMA SYSTEM

The Georgia-Alabama System is comprised of the Allatoona, Buford, Carters, J. Strom Thurmond, Walter F. George, Hartwell, Robert F. Henry, Millers Ferry, Richard B. Russell, and West Point Projects. Two of the four units at Carters are pump-generator units. Power from the system is sold to customers located in Georgia, Alabama, North and South Carolina, Mississippi, and Florida. Primarily as a result of continued droughts in the Southeast, repayment schedules for the Georgia-Alabama System accumulated large deficits over the fiscal years 1986 through 1989. During fiscal year 1989, Southeastern was able to implement a rate increase which had not been anticipated by then existing contracts. The rate increase was designed to insure system repayment in a timely manner. Power rates for this system, applicable through September 30, 1990, were approved by the Federal Energy Regulatory Commission on November 1, 1989.

Installation of the four pump-generator units at the Richard B. Russell Project, which will provide an additional nameplate capacity of 300,000 kilowatts, is scheduled to be completed by late 1991 or early 1992.

During fiscal year 1990, a rate presentation will be submitted to the Federal Energy Regulatory Commission for the Georgia-Alabama System rates for the period beginning October 1, 1990.

CUMBERLAND SYSTEM

The Cumberland System includes the Wolf Creek, Center Hill, Dale Hollow, Old Hickory, Cheatham, Barkley, J. Percy Priest, Cordell Hull and Laurel Projects. The projects are located on the Cumberland River, or its tributaries, and are located in Tennessee and Kentucky.

System power is marketed to customers located in Tennessee and in portions of Mississippi, Kentucky, Alabama, Georgia, Illinois, and North Carolina. Power rates, applicable through June 30, 1994, were approved by the Federal Energy Regulatory Commission on a final basis on September 26, 1989.

KERR-PHILPOTT SYSTEM

Power from the John H. Kerr and Philpott Projects, located in the Roanoke River Basin in Virginia, is marketed to customers in Virginia and North Carolina. Power rates for this system, applicable through September 30, 1991, were approved on a final basis by the Federal Energy Regulatory Commission on January 23, 1987.

JIM WOODRUFF SYSTEM

The Jim Woodruff Project is located on the Apalachicola River on the Georgia-Florida state line. All dependable capacity available at the Project is sold to preference customers in western Florida. Revised power rates for the Jim Woodruff Project applicable from August 20, 1987, through August 19, 1992, were approved on a final basis by the Federal Energy Regulatory Commission on September 11, 1987.

PROJECT OPERATIONS AND HYDROLOGICAL CONDITIONS

The projects in the Georgia-Alabama System have recovered from the prolonged drought of the past several years. No purchase of replacement energy to support contractual requirements in this system is expected this year. However, a degree of concern is present should the Corps of Engineers implement their Water Control and Drought Contingency Plans in the event streamflow conditions are below normal later this year. Implementation of these plans could result in Southeastern having to purchase replacement energy to meet minimum contractual quantities even though the projects are in relatively good condition. An additional concern is the possible reallocation of storage benefits away from power to other project purposes by the Corps of Engineers without the appropriate reimbursement to the power program.

The Jim Woodruff System, which is largely dependent upon conditions existing at upstream projects in the Georgia-Alabama System, has had a near normal water year accompanied by near normal generation.

The 9-project Cumberland System has received significant rainfall which has resulted in the generation of large amounts of excess energy in passing the additional inflows. The Kerr-Philpott System also has had good hydrological conditions which have resulted in well above average generation.

POWER MARKETING POLICY IMPLEMENTATION

Long-term contractual arrangements implementing the Cumberland System Power Marketing Policy have been negotiated and placed into effect with Tennessee Valley Authority, benefiting 160 preference customers within the Tennessee Valley Authority service area, and with preference customers in portions of Mississippi, Kentucky, Illinois, and North Carolina.

The Cumberland Policy also provides for the sale of Cumberland power to public bodies and cooperatives located in the Kentucky Utilities Company service area. Negotiations of a wheeling contract with the utility system as well as marketing contracts with the affected preference customers are being pursued.

Long-term arrangements have been placed in operation for the western portion of the Georgia-Alabama System implementing the Georgia-Alabama System Power Marketing Policy. Contracts have been executed with the operating utilities of the Southern Company (Georgia, Alabama, Mississippi, and Gulf Power Companies) and preference customers in their service areas. Under these arrangements, the conversion to the policy of ultimately marketing all power to preference customers will be phased in by June 1991.

During fiscal year 1989 contracts were negotiated between Southeastern and most of the preference customers in Georgia allowing a generation and transmission cooperative and an agency of municipal customers to transmit Southeastern's power to members of their organizations who are preference customers. Primarily because of the above stated arrangements, the fiscal year 1990 budget request for purchase power and wheeling was reduced from approximately $40 million to approximately $16 million for an overall reduction of approximately $24 million.

In fiscal year 1991 an increase of approximately $1.8 million is requested because contractual agreements specify that Southeastern will discontinue selling capacity to the Southern companies. This capacity will be wheeled by the Southern companies to the preference customers not located in Georgia and Southeastern will use appropriated funds to pay for these wheeling charges which were formerly settled through net billing arrangements.

Long-term contracts have been placed in operation with South Carolina Public Service Authority, Duke Power Company, South Carolina Electric & Gas Company, and preference agencies within their service areas covering the marketing of power produced in the eastern portion of the Georgia-Alabama System.

Installation of the four pump-generator units by the Corps of Engineers at the Richard B. Russell Project was delayed in 1988 by a district court injunction in a suit filed by the South Carolina Fish and Wildlife Commission and others in Charleston, SC. The Fourth Circuit Court of Appeals has overruled the injunction and held that the Corps may install the pump units, but cannot test or operate them without the approval of the U.S. District Court. In response to this ongoing litigation, the Corps of Engineers is expected to complete a supplemental environmental impact statement during 1990 and to complete installation of the units by late 1991 or early 1992.

Preliminary negotiations have begun to develop contracts for the provision of pumping energy, backup, and other logistical functions necessary to the pumping operation, and for the marketing of this additional capacity in the Georgia-Alabama System.

Long-term contracts have been placed in operation with Virginia Power, Carolina Power & Light Company, Appalachian Power Company, and preference entities within their service areas to implement the Kerr-Philpott Power Marketing Policy.

This concludes my statement, Mr. Chairman, and I would be happy to answer any questions that you may have.

Department of Energy
Washington, DC 20585

JOHN M. SHAFER
Administrator
Southwestern Power Administration
U. S. Department of Energy

Biographical Sketch

John M. (J.M.) Shafer was appointed Administrator of the Southwestern Power Administration (Southwestern) by the Secretary of Energy, effective September 3, 1988.

Born February 21, 1944, Shafer is a registered professional engineer and has been a career Federal employee since 1967. He came to Southwestern from the Western Area Power Administration (Western), where he served as Deputy Area Manager of the Loveland Area Office.

Shafer was graduated from the University of Wyoming in 1966 with a Bachelor of Science Degree in Electrical Engineering and accepted employment with the Southern California Edison Company in San Bernardino, California. In 1967 he joined the U. S. Bureau of Reclamation (Bureau) in Casper, Wyoming, as an electrical engineer. He held other engineering positions with the Bureau in Denver and Grand Lake, Colorado, before transferring to Western in 1978 after the power marketing responsibilities of the Bureau were transferred to the Department of Energy. He was appointed Deputy Area Manager of Western in April 1984.

Shafer and his wife, Michele, have a daughter, Kimberly, and a son, Tyler.

Statement of J. M. Shafer
Administrator, Southwestern Power Administration
Department of Energy
FY 1991 Appropriations Hearings

Mr. Chairman and Members of the Subcommittee:

It is a pleasure to represent the Southwestern Power Administration (SWPA) before this subcommittee and to present the budget request for Fiscal Year 1991. A few summary statistics provide a broad outline of SWPA's request.

	FY 1990	FY 1991	Difference
Total Budget Program	$45,180,000	$44,296,000	$- 884,000
Reimbursable Authority	-11,723,000	- 8,899,000	+2,824,000
Total Budget Request	$33,457,000	$35,397,000	$ 1,940,000
Available Prior Year Balances	- 8,400,000	-15,290,000	-6,890,000
Budget Authority (Appro.)	$25,057,000	$20,107,000	$-4,950,000

SWPA's initiatives to use non-Federal funds through reimbursable authority continue to significantly impact our budget request to the extent that in FY 1991 the total budget program is offset by $8,899,000 or 20 percent. The inclusion of $4,199,000 of reimbursable authority for purchase power and wheeling is a significant step in the direction of SWPA's long-term objective of eventually eliminating the need for requesting Federal funds for the purchase power and wheeling requirements. Although SWPA experienced what might be considered average rainfall in FY 1989, the service area did experience a period of drought from October 1988 through February 1989. SWPA was able to effectively utilize the Integrated System and its banking arrangements to meet its contractual needs and generate the income necessary to meet repayment projections. SWPA's FY 1991 appropriations request will allow the continuance of an efficient and effective program.

MISSION/STAFFING

SWPA, established under Section 5 of the Flood Control Act of December 22, 1944, is headquartered in Tulsa, Oklahoma. SWPA markets hydroelectric power generated at Federal dams, at the lowest possible rates consistent with sound business principles, giving preference in the sale to public bodies and cooperatives. SWPA schedules the operation of the U.S. Army Corps of Engineers' (Corps) generating facilities for optimum resource utilization. SWPA designs, constructs, and operates its transmission facilities in a safe, reliable manner, consistent with good utility practices. SWPA facilitates the development of environmentally clean renewable resources and energy conservation practices. In carrying out its mission, SWPA conducts business in an open manner with customers, employees, the Department of Energy, the Congress, and the general public.

The requested FY 1991 staffing level is 186 Full Time Equivalent (FTE).

FY 1991 BUDGET INFORMATION

SWPA's budget is subdivided into three general activities: (1) Purchase Power and Wheeling, (2) Operations and Maintenance, and (3) Construction.

	FY 1990	FY 1991	Change
Purchase Power and Wheeling	$14,143,000	$12,098,000	$-2,045,000
Operations and Maintenance	17,301,000	17,516,000	+ 215,000
Construction	13,736,000	14,682,000	+ 946,000
Total Budget	$45,180,000[a]	$44,296,000	$ - 884,000

[a] FY 1990 reflects final Gramm-Rudman-Hollings sequester.

I will summarize the pertinent information in each of these activities.

(1) Purchase Power and Wheeling

This activity provides for the funding of energy purchases necessary to meet the Government's power sales contract commitments to utility customers. The proposed $12,098,000 budget for purchase power and wheeling costs is a reduction of $2,045,000 from FY 1990, due to a reduction in reimbursable activity in this area. Contracts have been renegotiated to require customers to receive and compensate suppliers directly for their purchases rather than reimbursing SWPA for purchases on their behalf. The budget amount includes $7,899,000 for direct program activity and $4,199,000 of reimbursement authority as will be explained later in my statement.

(2) Operations and Maintenance

This activity provides for the support of 186 FTE, their work in the areas of power marketing, operation of the transmission system, maintenance of all physical facilities, and general program management. The proposed $17,516,000 budget for operations and maintenance costs is an increase of $215,000 over the FY 1990 Budget after Gramm-Rudman-Hollings sequestration. The increases are primarily in the areas of technical service contracts which will provide for specialized expertise in the areas of power system planning analysis, development and design; built-in increases for pay and benefits; and a continuing demand for support in the reimbursable activity area.

(3) Construction

This activity provides for the construction or modification of transmission, substation, switching, and communication facilities. The proposed $14,682,000 request for construction is an increase from FY 1990 of $946,000. This includes funding of approximately $6,887,000 for direct program activity made up of $2,072,000 for the replacement of necessary transmission system equipment which is approaching 45 years of age, and $4,815,000 for the modifications necessary to assure compatibility of the SWPA system with the rest of the constantly growing regional interconnected system.

The proposed request also includes $2,975,000 to support the accomplishment of the $4,500,000 in reimbursable system enhancements in the form of joint regional efforts to improve the interconnected power transmission system.

CURRENT FINANCIAL STATUS

I am pleased to report to this subcommittee that SWPA is in good financial condition. All available power is under contract and is widely distributed throughout the six-state region served by SWPA. Our hydroelectric energy production experienced the fifth consecutive year of above-average energy generation and produced revenues in excess of $90,980,000. For the eighth straight year, SWPA has improved its repayment status. The preliminary results of FY 1989 operations made an estimated $22,800,000 available for repayment of investment.

Based on the unaudited financial statements, SWPA's cumulative repayment is $186,700,000 on a total repayable Federal investment of $895,700,000, or 20.8 percent.

RATES

Timely rate increases have helped SWPA maintain its good financial condition. Pursuant to SWPA's policy of making annual rate reviews to assure a positive repayment posture, rate proposals during 1988 resulted in increases of 3.2 percent for the Integrated System rates and 5.6 percent for the Sam Rayburn Dam rate. These increases became effective July 1, 1988, on interim approval of the Under Secretary of Energy. Final approval by the Federal Energy Regulatory Commission (FERC) for the Sam Rayburn rate increase was obtained on October 11, 1988, and the final approval of the Integrated System rate increase was obtained on March 3, 1989.

During FY 1989, a new rate was established for the Robert Douglas Willis Hydropower Project. This project is the first in the Nation to be constructed by the Corps entirely with non-Federal funds. The interim rate was approved by the Deputy Secretary of Energy on June 28, 1989, and became effective when the project was declared in commercial operation December 1, 1989. Final rate approval was obtained from FERC on December 20, 1989.

Preliminary work on the SWPA FY 1990 Power Repayment Studies indicates the need for a system rate increase this year of 15 percent primarily due to increases in operation and maintenance costs of the Corps' projects, and SWPA's transmission system. Customer participation is being encouraged, and we expect to implement the resulting rate adjustments following formal public comment and approval by the appropriate authority.

REIMBURSABLE AUTHORITY

SWPA's initiatives to reduce its need for appropriated funds through the use of reimbursable authority have been focused in two areas, Federal and non-Federal.

The level of reimbursable authority requested for FY 1991 is $8,899,000, a decrease of $2,824,000 from the FY 1990 request. This request proposes to use reimbursed funds to finance $4,700,000 in additions and modifications to transmission lines, substations, and electronic facilities, and will come from various SWPA utility customers. These additions and modifications are required by our customers. The work, which will be performed by SWPA using non-Federal funds, will provide adequate capacity and more reliable service to our customers. The remaining $4,199,000 requested is for Purchase Power and Wheeling. The $4,136,000 Federal portion of this amount provides for the elimination of duplicate appropriations requested by both SWPA and by the Department of Defense installations served by SWPA. The $63,000 non-Federal portion will be received from an Oklahoma municipal customer.

Prior to approval of reimbursable authority in the FY 1988 Appropriation Act (P.L. 100-202), power purchases for the military installations, the Oklahoma municipal customers, and the power system improvements were made with appropriated funds, and the expenditures were reimbursed to SWPA by the Department of Defense and utility customers and deposited with the Treasury as miscellaneous receipts. Under the requested reimbursable authority, SWPA will be able to continue to provide the same services and accommodate customer-required enhancements of SWPA's system by direct use of other Federal and non-Federal funds.

The foresight of this subcommittee, in approving SWPA's use of the continuing fund to pay for purchase power expenses, when it is determined that such expenditures are necessary, reduces the risk of having to request supplemental funding.

MAINTENANCE OF THE TRANSMISSION SYSTEM

Of the $17,516,000 operation and maintenance budget, $8,000,000 is provided for direct maintenance of SWPA's capital plant and equipment. This program involves both preventive and corrective maintenance on 1,380 miles of a high-voltage transmission system spread across three states.

The preventive and corrective maintenance program consists of controlling vegetation on rights-of-way; replacement of poles, braces, and insulators; and servicing transformers, circuit breakers, disconnect switches, relays, meters, and VHF and microwave radios.

Special emphasis maintenance programs in FY 1991 will be to review, and if necessary, revise the vegetation management program, continue the effort to remove and dispose of equipment containing more than 50 ppm of polychlorinated biphenyls, asbestos abatement, replace equipment that is over 40 years old, and replace insulators with a high failure rate and no exact replacement available on the market.

In addition, considerable maintenance effort will be expended in the performance of duties, such as contracting officers technical representative, project management, and construction inspection in support of new construction activities.

JOINT TRANSMISSION PLANNING

SWPA has initiated a ten-year program of planned improvements to the aging transmission system to assure the ability to fulfill its mission for marketing Federal power and to meet obligations to the interconnected Southwest Power Pool. In connection with this effort, SWPA is working with customers and other interconnected utilities to identify mutually beneficial joint-participation projects. Such projects will make more efficient use of existing transmission lines or upgrade transmission capacity using existing rights-of-way, minimizing the need for new construction; resulting in significant cost savings and less adverse environmental impacts.

HYDROELECTRIC POWER ACTIVITIES

SWPA's significant hydroelectric power activities are:

(1) Non-Federal Financing Activities

SWPA continues to facilitate non-Federal financing of Federal hydropower projects. The Corps' construction of the Robert Douglas Willis Hydropower Project, funded by the Sam Rayburn Municipal Power Agency, began in 1987 and was completed in November 1989. The project was placed in service on December 1, 1989, making it the Nation's first Federally owned and operated hydroelectric project whose construction cost was financed in total by non-Federal interests.

During the past year, in accordance with Public Law 99-662, negotiations to develop a new hydroelectric project by the Cherokee Nation at the W. D. Mayo Lock and Dam were terminated. The termination was based on an inequitable sharing of costs and benefits of a project whose costs were projected to be at the high end of today's market.

In November 1989, agreements were signed by the Grand River Dam Authority (GRDA), the Corps, and SWPA to initiate construction of units five and six at Fort Gibson Dam on the Grand River in Oklahoma. Under the provisions of the agreements, GRDA will fund 100 percent of the estimated $30,000,000 project.

SWPA has been approached by existing and potential preference customers regarding the possible development of other Federal hydroelectric power projects in the region, including the expansion of the existing hydropower plants at Norfork Dam on the North Fork River in north central Arkansas, and Denison Dam on the Red River near Denison, Texas. These projects are in various stages of analysis and would be designed and constructed with non-Federal funds.

(2) Harry S. Truman Interim Operating Plan

SWPA's objective is to gradually move toward full hydroelectric power generation at the Harry S. Truman Project in Missouri. Negotiations by the representatives of the Corps, the State of Missouri, SWPA, and

Associated Electric Cooperative, Inc., which is the scheduling agent, resulted in an interim operating plan that allows for conditional steps towards realizing the full power potential at the project. With these conditions on the use of the project, we are able to earn revenues to repay the project costs on only about 40 percent of its production capability.

(3) Denison Dam Management Plan

The Lake Texoma Advisory Committee, which was established with 1986 legislation by this committee, is working very well. Each group of Texoma's users have been meeting and using the opportunity to learn each other's concerns and needs. All have certainly gained a greater appreciation of the difficulties in the operation of the multi-purpose lake. The complaints and demands of individual interests have eased as a result of the Committee's efforts.

CLOSING

In conclusion, Mr. Chairman, SWPA has again taken initiatives to reduce its total budget program from what it would be without utilizing non-Federal funds through reimbursable authority. SWPA's program is committed to operating in an open, business-like manner, providing a safe, reliable transmission system to deliver renewable hydroelectric power, and maintaining a sound financial condition. SWPA has implemented and continues to develop rates to assure that sufficient revenues are generated to return to the Treasury all operating expenses, interest, and investment associated with the construction of the power generating and transmission facilities of the Southwestern Federal

Power System in accordance with the statutory mandate of Section 5 of the 1944 Flood Control Act.

We appreciate the cooperation and support provided by the members of this subcommittee. I am privileged to serve as Administrator and to work with you and your subcommittee and with the customers and employees of SWPA.

Statement of William H. Clagett
Administrator
Western Area Power Administration
Department of Energy
FY 1991 Appropriations Hearings

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to appear before you today to present an overview of the Western Area Power Administration's (Western) budget request for fiscal year (FY) 1991 and to discuss our programs and accomplishments. Western is committed to developing new and better ways to provide reliable, cost effective energy to our customers. I believe the FY 1991 budget proposal will position us for the challenges of the 1990s, while allowing us to continue to meet our mission of marketing Federal hydroelectric resources at the lowest possible rates to our consumers consistent with sound business principles and to repay the taxpayers' investment in our system in a timely manner.

WESTERN'S MISSION

Western is responsible for marketing and transmitting Federally produced power to over 600 wholesale customers which, in turn, provide electric service to millions of retail power consumers throughout a 15-state area. In FY 1991, this responsibility will include the operation and maintenance of nearly 17,000 circuit miles of transmission line, 267 substations, and other associated power facilities within our 1.3 million square-mile marketing area. Electric power marketed by Western in FY 1991 will be generated at 52 plants operated primarily by the Bureau of Reclamation (Reclamation) and the U.S. Army Corps of Engineers (Corps). The maximum FY 1991 operating capability of all of these powerplants, including the Federal share of the coal-fired Navajo Generating Station marketed by Western, will be about 10,500 megawatts.

Keeping our operations efficient is essential if Federal wholesale power rates are to remain affordable. To this end, Western continues to find new opportunities for cost containment, particularly in the area of reducing Western's administrative costs.

We will continue to review and analyze our costs to keep our commitment to operate an electrical system that is economical and dependable.

For example, Western is in the process of consolidating, by January 1992, the Boulder City, Nevada Area Office with the Phoenix, Arizona District Office into one office located in Phoenix. The reorganization will eliminate duplicative administrative functions and reduce O&M expenses. Studies have shown a one-time dollar savings of $2.8 million and continued annual savings of $1.5 million with no decrease in operational effectiveness or service provided. The move will be made in stages to reduce personal hardship on employees.

ENVIRONMENTAL IMPACT STATEMENTS

Western is preparing an environmental impact statement (EIS) for the Post 1989 General Power Marketing Criteria for the Colorado River Storage Project. Additionally, seven EISs will be initiated or completed in FY 1991 on various aspects of the transmission system construction program.

Glen Canyon Dam Operations

In 1989, Reclamation initiated the preparation of an EIS on the operation of Glen Canyon Dam on the Colorado River in northeastern Arizona to analyze the existing operations criteria of the dam and develop a set of environmental criteria for use during development of the dam's annual operating plan. Western is a participating agency with Reclamation in the preparation of this EIS. Western is also involved in the assessment of special water releases for the purpose of gathering additional environmental data below the dam as part of the Glen Canyon Environmental Studies research program.

Changes in the dam's water release patterns as a result of the EIS could adversely affect Western's power customers and our purchase power budget. A Western study concluded that, during adverse water conditions, increasing the minimum river flow levels below Glen Canyon Dam could reduce hydroelectrical power generation and result in increased annual power purchase expenses of as much as $17.0 million.

STATUS OF WATER CONDITIONS IN WESTERN'S MARKETING AREA

As of March 1, 1990, drought conditions continue to prevail in the western United States. Below-normal reservoir storage is prevalent throughout Western's service area river basins. For this reason, Federal hydroelectric generation was about 80 percent of normal in FY 1989. Current predictions indicate that hydroelectric generation may be as low as 79 percent of normal in FY 1990, even with normal streamflow, simply because of the need to refill reservoirs. Western's power purchases are directly related to generation levels, which are dependent on water conditions. If drought conditions continue through the remainder of FY 1990, estimated power purchases could equal or exceed our FY 1989 high of 8.34 billion kilowatthours. Non-Federal power generation capabilities should be sufficient to allow Western to purchase any power needed to meet contractual commitments.

BUDGET HIGHLIGHTS

The FY 1991 appropriation request of $298.5 million for construction, rehabilitation, operation, maintenance, and purchase power and wheeling (including $4.7 million of permanent budget authority) is an increase of $2.8 million above the FY 1991 base level. This request excludes the application of another $28.0 million in unobligated balances carried forward from FY 1990. The overall program increase reflects higher spending on construction and rehabilitation and operation and maintenance activities offset by greater use of unobligated prior year funds.

We are also requesting $115.8 million in obligational authority in FY 1991 for the Colorado River Basins Power Marketing (CRBPM) Fund, an increase of $16.8 million (17 percent) above the FY 1991 base level. This increase is primarily attributable to greater interest expenses resulting from new capital investment being placed in service.

The personnel staffing level of 1,300 full-time equivalents requested in FY 1991 reflects a decrease of 83 FTE (6 percent) from FY 1990.

Specific appropriation or fund amounts requested in FY 1991 compared to the FY 1991 base level are as follows:

BUDGET REQUEST SUMMARY
(Dollars in Thousands)

Appropriation or Fund/Activity	FY 1991 Base Level 1/	FY 1991 Request 1/	Change
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE			
Construction and Rehabilitation	$ 97,477	$110,520	+$13,043
Operation and Maintenance	108,905	115,509	+ 6,604
Purchase Power and Wheeling	100,223	100,000 2/	- 223
SUBTOTAL (BUDGET AUTHORITY), CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE	$306,605	$326,029	+$19,424
Use of Unobligated Balances (Net)	- 10,968 3/	- 27,565	-16,597
TOTAL BUDGET AUTHORITY	$295,637	$298,464	+$ 2,827
COLORADO RIVER BASINS POWER MARKETING FUND (OBLIGATIONAL LIMITATION)	$ 99,000	$115,800	+$16,800

1/ Includes permanent budget authority for the Boulder Canyon Project. The FY 1991 base level includes the FY 1990 appropriation plus additional costs for pay and space rental.

2/ Includes planned unobligated balances of $27,000.

3/ This is the difference between the $38,500 unobligated balance at the beginning of FY 1990 and the $27,600 planned unobligated balance at the end of FY 1990.

CONSTRUCTION AND REHABILITATION

During FY 1989, Western completed work on approximately 200 miles of new or upgraded 230-kv transmission lines including the Conrad-Shelby in Montana, the Liberty-Parker

No. 2, in Arizona, and the Casper-Glenrock in Wyoming. Construction was completed on four substations, including the installation of phase-shifting transformers in northwestern New Mexico, 10 substation additions, and the Loveland Power Marketing and Operations Center Addition.

Construction was recently completed on the 102-mile Bears Ears-Bonanza 345-kV line in Colorado and Utah. Approximately 42 miles of new or rebuilt transmission lines will be constructed, including the Tracy-Livermore 230-kV line in California, and the Buffalo Bill 69-kV transmission project in Wyoming by the end of FY 1990. Work will be completed on six communications sites and 22 substation additions, with new substations to be constructed at Kremmling and Bears Ears in Colorado, Lawrence Livermore National Laboratory in California, and Spence in Wyoming.

Transmission Lines and Terminal Facilities

Of the $110.5 million requested for construction and rehabilitation in FY 1991, $41.6 million is for construction of transmission lines, including the 110-mile Jamestown-Grand Forks 230-kV transmission line project in North Dakota, the 35-mile Charlie Creek-Belfield 345-kV line in North Dakota, the 23-mile Gering-Bayard 34.5/69-kV line in Nebraska (part of the Limestone-Gering-Bayard-McGrew transmission line upgrade), the 63-mile Lovell-North Cody-Big George 115-kV line in Wyoming; and the rebuilding of 18 miles of line for the Miracle Mile Consolidation Project in Wyoming. Other 230-kv transmission line work includes building an 80-mile Sidney-North Yuma transmission line in western Nebraska and northeastern Colorado, and the 14-mile Roseville-Elverta No. 2 transmission line in California. Western is participating in development of the 110-mile Kansas 345-kV transmission project which will facilitate delivery of Federal power to new customers in Kansas. Service to these customers was made possible by successful completion of the Sidney Converter Station in Nebraska.

Harold T. (Bizz) Johnson Transmission Intertie

In FY 1985 Congress authorized construction of a third 500-kV AC transmission line between the Pacific Northwest and California to allow for mutually beneficial power sales between the two regions and to improve system reliability. The California portion of the project, known locally as the California-Oregon Transmission Project (COTP), is estimated to cost $453.0 million. The COTP consists of a 346-mile long transmission line from southern Oregon to central California and associated substations and communications facilities.

Right-of-way acquisition that was initiated early last year is now about 70 percent complete. Several major construction contracts have been released for bid, and contracts have been awarded for construction management and transmission line materials. All of the major construction contracts are currently scheduled to be awarded by the middle of FY 1991. The project schedule continues to be flexible.

Although the project participation agreement is still being negotiated, and the three investor-owned utilities IOU's have not yet received State regulatory approval, the project has progressed into the early stages of construction. The participation agreements provide an opportunity for the IOU's to "back out" in the event that regulatory approval is not obtained. The remaining participants, including Western, would acquire any additional capacity made available.

Northern Arizona Transmission Project

Western is considering construction of a 190-mile, 345- or 500-kV transmission line and associated terminal facilities to connect the Four Corners/Shiprock area in northwestern New Mexico with the Glen Canyon/Navajo area in northern Arizona. This transmission line would ensure that Western has the capability of meeting its contractual obligations to deliver power to its customers and, by extending the existing transmission path south and west, would allow optimum coordination of electric power generation in Arizona, Colorado, New Mexico, Utah, and Wyoming. The line would cross Navajo Tribal lands and would be compatible with long-term power supply requirements of the Navajo Tribal utility authority.

Studies for Future Facilities

$14.5 million of the transmission line construction and rehabilitation program in FY 1991 is to continue planning and engineering analyses, land services, and environmental studies. The engineering analyses are required to ensure that Western continues to meet system capability needs, deliver firm power to customer loads, and explore mutually beneficial transfers of power between adjacent systems or regions. While conducting planning studies, Western seeks joint participation efforts with other utility groups. Due to the interdependence of electric utility systems, this approach increases system reliability and efficiency, minimizes environmental impact, and reduces the need for Federal appropriations for both construction and, ultimately, operations and maintenance.

Planning and developmental activities are continuing for a second Pacific Intertie project which was authorized in 1964, but has not been constructed. Each of the project phases, Mead-Phoenix (Phase I), Mead-Adelanto (Phase II), Mead-Northwest (Phase III), would provide alternative transmission paths for the benefit of project participants.

Western is also evaluating the feasibility of jointly constructing a 224-mile 345-kV transmission line from the Shiprock Substation to a point near Albuquerque, New Mexico. This proposed project would offer an alternative to wheeling contracts for delivery of the Colorado River Storage Project power to customers in New Mexico. Other alternate routes are also being studied.

Substations and Other Construction

Western's FY 1991 construction and rehabilitation request also includes $33.9 million for substation work and $20.5 million for the construction or upgrade of other facilities. Substation work consists of sixteen substation additions and includes equipment purchases for the Basic Substation in Nevada, and continuing work on the Tracy Substation in California. We will also purchase equipment for the Malin Substation series capacitor replacement in southern Oregon and the new Fort Morgan Substation in Colorado. Other major capital items include the acquisition and installation of System Control and Data Acquisition (SCADA) and microwave equipment and continued modification of the Phoenix Operation and Maintenance Center.

SYSTEM OPERATION AND MAINTENANCE

The FY 1991 operation and maintenance request is $115.5 million, an increase of $6.6 million above the FY 1991 base level. The increase is attributable to the rising costs of equipment, goods, and services and for replacement of equipment needed to safely maintain Western's facilities at industry standards.

Routine O&M

Of the total amount, $95.9 million is requested for normal transmission system operation and maintenance expenses for personnel, materials and supplies, heavy mobile equipment replacement, wood pole treatments, data processing, and administrative expenses.

Conservation and Renewable Energy

Western's Conservation and Renewable Energy (C&RE) budget request is $2.9 million. An additional $1.2 million will be funded through the CRBPM Fund. The C&RE program is designed to encourage Western's customers to develope cost effective energy conservation measures and renewable energy projects which demonstrate responsible stewardship of natural resources.

Hazardous and Toxic Materials

Managing our activities in an environmentally sound manner is a very high priority in Western. We continue to monitor our operation and maintenance activities via an internal auditing program to assure compliance with the many applicable Federal regulations. To date, this program has been instrumental in helping Western dispose of millions of pounds of hazardous and toxic materials. In addition, a computerized inventory, tracking, and reporting system was implemented in February 1990 to assist in polychlorinated biphenyls disposal.

Accidental releases of hazardous and toxic materials at Western's sites likely predate Western's establishment in 1977. Site investigations are being performed in FY 1990 at five sites across our system. We will continue site investigation, testing, and remedial actions to bring remaining Western's facilities into compliance with applicable local, state, and Federal regulations.

Replacements

The remaining $16.7 million is requested for replacements and additions, including: purchase of circuit breakers and transformers to replace aging equipment presently in service; installation of terminal ground switches; and replacement and upgrades to system telemetering, supervisory control, microwave, radio, and protective relaying equipment.

Western will continue to explore ways to further improve the maintenance management program. Significant cost savings have been realized from the extension of maintenance intervals and implementation of standard maintenance procedures. Continuing the comprehensive analysis of maintenance schedules, critical equipment replacement, station commissioning work, and required maintenance intervals will enable Western's managers to further reduce costs while maintaining a high level of operational reliability.

PURCHASE POWER AND WHEELING

The appropriation request for FY 1991 Purchase Power and Wheeling activities is $100.0 million, essentially constant with the FY 1991 base level. Western purchases energy, capacity, and wheeling services to assure firm power deliveries, primarily for the Central Valley Project (CVP) in California.

Alternative financing arrangements, such as net billing, bill crediting, reimbursable authority, and nonappropriation transfers are used to fund a large portion ($124.7 million) of the purchase power and wheeling program activity in FY 1991, thereby minimizing appropriations requests. Receipts deposited in the U.S. Treasury are offset by the amount of alternative financing used to fund purchase power and wheeling.

In FY 1990, Congress authorized Western to use its continuing fund to defray power and wheeling expenses during periods of below-normal hydropower generation, as an alternative to requesting supplemental appropriations. Due to the continued extreme drought conditions Western is using the continuing fund to supplement power purchases for the Pick-Sloan Missouri Basin Program and might use it for the Colorado River Storage Project.

Provision of Power to Department of Defense Facilities

Western has 48 Federal agencies as power customers, most of which are Defense Department facilities. These Federal agencies buy 5.5 percent of Western's energy and provide 8.7 percent of Western's revenues. In May 1987 Western signed an agreement with the Department of Defense (DOD) which establishes conditions for discussion. Each agency would work with the other to maximize the benefit of DOD's Federal power allocations, provide and facilitate transmission service to Defense loads, perform special studies, and facilitate arrangements for supplemental power supplies for new loads at Defense installations.

The U.S. Air Force is constructing an Over-the-Horizon Backscatter Central Radar System in South Dakota and has requested Western to provide support in planning, designing, constructing, operating, and maintaining two 115-kV power lines (60 miles total) and associated substation facilities. Western will be a participant in the environmental process for the radar system and transmission line corridors. The Air Force will reimburse Western for all Western's costs associated with the project.

POWER MARKETING PLANS

In late 1988, the National Wildlife Federation (NWF) and several other environmental groups filed suit against Western questioning DOE's findings that the Post-1989 General Power Marketing Criteria (Critreia) for the Colorado River Storage Project had no significant environmental impact and, therefore, no EIS needed to be prepared on these Criteria. Western was granted permission from the judge to execute its post-1989 power contracts with a "reopener" clause permitting Western to modify contract power allocations should Western subsequently prepare an EIS on its Criteria, as a result of the EIS on Glen Canyon Dam operations being prepared by the Department of the Interior. By mid-April 1989, Western had executed all 81 post-1989 contracts.

In September 1989, Western announced that it would prepare an EIS on the Criteria. On September 29, the judge issued an order which temporarily suspended the post-1989 power contracts until Western completed an EIS on the Criteria or prepared an acceptable interim plan reducing the post-1989 allocations to levels equal to the pre-1989 firm commitments. Western developed and submitted the Salt Lake City Area Integrated Projects (SLCA/IP) Interim Marketing Plan and contract amendments to the judge. They were approved by the court on November 6, 1989, putting the SLCA/IP Criteria and contracts into effect on December 1, 1989. The Interim Marketing Plan provides for a pro-rata reduction in all post-1989 SLCA/IP firm power commitments so that the total post-1989 SLCA/IP commitments do not exceed the pre-1989 commitments, pending completion of Western's or the Department of the Interior's EIS.

Western is continuing the public involvement and environmental review process for the 1994 Central Valley Project (CVP) marketing plan, which will govern the sale of approximately 539 megawatts of CVP power.

Preliminary discussions have begun with customers and interested parties concerning marketing of the Pick-Sloan Missouri Basin Program-Eastern Division resources after existing contracts expire in the year 2000. Approximately 2000 megawatts of power must be reallocated. The timeframe for this activity is uncertain due to the need for Reclamation and the Corps to complete studies on water depletion and generation and due to the need to evaluate possible new operational constraints caused by environmental concerns.

The Hoover Power Plant Act of 1984 requires that a marketing plan be developed to market surplus power generated by the coal-fired Navajo Generating Station. This marketing plan was completed on December 1, 1987. Western, as the marketing entity responsible for the sale of surplus power, has been negotiating the long-term Navajo power sales contracts.

POWER RATES, REVENUES, AND REPAYMENT

The Administration plans to submit legislation this year to improve the power marketing administrations' financial practices by making recovery of investments in assets more timely and businesslike through the use of market interest rates and straight-line amortization of unpaid investments. If repayment reform is implemented in FY 1991, total Western revenue would be $882.6 million, as compared to $656.0 million without repayment reform, an increase of $226.6 million or 34.5 percent. The increase in residential rates from repayment reform on the projects for which Western markets power ranges from no increase to a 32 percent increase. The weighted average increase is approximately 8 percent for all projects.

Status of Project Power Rate Adjustments

During FY 1989, and to date in FY 1990, Western has been involved with seven rate adjustments that are subject to Federal Energy Regulatory Commission (FERC) approval. One is still in the public process, one was withdrawn from consideration prior to submittal to the FERC, and five have been submitted to the FERC. The Salt Lake City Area Integrated Projects firm power rate adjustment is about midway through the public consultation process. A Boulder Canyon Project rate adjustment was withdrawn when updated project cost data indicated that implementation of the proposed rates would have an adverse financial impact upon the project. Of the five rates that have been submitted to the FERC, the Pick-Sloan Missouri Basin Program-Eastern Divison and the Loveland Area Projects firm power rate adjustments are the most noteworthy. The Pick-Sloan Missouri Basin Program-Eastern Division composite rate increased from 7.44 mills per kilowatthour to 8.32 mills per kilowatthour effective October 1, 1989.

The Loveland Area Projects composite rate of 14.29 mills per kilowatthour is a new rate, effective in October 1989, which reflects the merging of the Western Division of the Pick-Sloan Missouri Basin Program and the Fryingpan-Arkansas Project for ratesetting purposes. The anticipated annual revenue increases resulting from these five rate adjustments total about $62.0 million.

Western is in the initial stages of pursuing power and/or transmission rate adjustments for the Boulder Canyon Project, the Pick-Sloan Missouri Basin Program-Eastern Division, and the Loveland Area Projects. Enactment of the Administration's repayment reform proposal will require additional rate adjustments for most of Western's projects.

Power Revenues and Energy Sales

In FY 1989, Western marketed 35.4 billion killowatthours of available energy to wholesale power customers and received gross operating revenues of $578.8 million. Estimates for FY 1990 energy sales and revenues are 38.7 billion kilowatthours and $657.1 million, respectively. For FY 1991, energy sales are estimated at 38.2 billion kilowatthours and revenues are estimated at $656.0 million without repayment reform and $882.6 million if repayment reform legislation is enacted. The low level of energy sales for FY 1989 is primarily due to below-average water conditions. The increase in revenues in FY 1991 is primarily due to anticipated improved water conditions and implementation of rate increases to meet project repayment.

Repayment of Investment

As of September 30, 1989, the investment to be repaid by Western's power system revenues totaled approximately $5.0 billion, of which $2.1 billion has been repaid. Cumulative power revenues total $8.7 billion and have been applied as follows: $3.3 billion for O&M and other expenses; $1.8 billion for purchase power and wheeling; $1.5

billion for interest; and $2.1 billion for repayment of investment in facilities and assistance to irrigation. In FY 1989, despite persistent drought in the Western United States, $23.0 million was applied to repayment of investment. To date, 42.6 percent of the investment assigned to power for repayment has been repaid. The following table summarizes Western's repayment status by project:

STATUS OF REPAYMENT AS OF SEPTEMBER 30, 1989
(DOLLARS IN MILLIONS)

Project Power System	Initial Year of Repayment Studies	Cumulative Power Revenues	Cumulative Exp. *	Power Investment**	Nonpower Investment to be Repaid by Power	Cumulative Deferred Expense	Invest. Repaid to Date	Unpaid Bal. of Invest.
Boulder Canyon	1937	$651	$477	$207	$ 25	--	$ 174	$ 58
Central Valley	1944	2,318	2,103	435	62	--	215	282
Collbran	1963	17	14	11	5	--	2	14
Colorado River Basin (Navajo)	1974	828	762	--	65	--	65	--
Colorado River Storage	1963	1,510	959	799	709	--	552	956
Falcon-Amistad	1955	37	31	44	--	--	6	38
Fryingpan-Arkansas	1982	33	33	190	--	9	--	190
Pacific Northwest-Pacific Southwest Intertie 1/	1968	55	55	53	--	2	--	53
Parker-Davis	1942	491	292	208	27	--	199	36
Pick-Sloan Missouri Basin 2/	1950	2,750	1,853	1,592	516	--	898	1,210
Provo	1958	4	3	1	2	--	1	2
Rio Grande	1949	50	42	9	5	--	8	6
Washoe	1987	--	--	9	--	1	--	9
TOTAL		$8,744	$6,624	$3,558	$1,416	$ 12	$2,120	$2,854

* Cumulative Expenses includes O&M, purchased power, interest, and other costs paid from revenues.

** Power Investment does not include Deferred Expense or repayment assistance to nonpower investment, primarily irrigation investment. Nonpower Investment and Deferred Expenses are shown as separate columns.

1/ Alternating Current facilities only.

2/ Includes the four integrated projects (North Platte, Shoshone, Colorado-Big Thompson, and Kendrick).

Mr. Chairman, this concludes my prepared statement of Western's FY 1991 budget request and program status. If you or the Subcommittee members have any questions, I would be pleased to respond.

THURSDAY, MARCH 22, 1990.

OFFICE OF ENERGY RESEARCH: SUPERCONDUCTING SUPER COLLIDER

WITNESSES

DR. JAMES F. DECKER, ACTING DIRECTOR, OFFICE OF ENERGY RESEARCH, UNITED STATES DEPARTMENT OF ENERGY

DR. SIDNEY D. DRELL, PROFESSOR AND DEPUTY DIRECTOR, STANFORD LINEAR ACCELERATOR CENTER, STANFORD UNIVERSITY

DR. TSUNG-DAO LEE, ENRICO FERMI PROFESSOR OF PHYSICS, COLUMBIA UNIVERSITY

Mr. BEVILL. The committee will come to order.

I wish to welcome Professors Doctor Drell from Stanford and Doctor Lee from Columbia. When Secretary Watkins was testifying before this committee on the Superconducting Super Collider he urged that we hear from you gentlemen.

The committee has supported the SSC since its inception in 1984; however, a project of this size and cost is not without its detractors.

With the large cost increase—originally $4 billion, now over $8 billion and growing—many Members of Congress and some members of the scientific community feel that we just can't afford this project at this time under the very tight budget constraints we are operating.

I hope you will use your formidable knowledge to help us to support the SSC and help prepare a record that will convince any opponent to support the SSC.

We are pleased to have each of you. Doctor Decker, we are always glad to have you back with us again.

Dr. DECKER. Thank you.

Mr. BEVILL. You may submit your prepared written statements and then proceed as you wish. You can summarize or read or whatever you want to do.

[Prepared statements are included at the end of the hearing record.]

OPENING REMARKS

Dr. DECKER. Thank you, Mr. Chairman.

I appreciate very much your holding this special hearing on the Superconducting Super Collider. The SSC is an important project for the country. It is a critical part of the Administration's initiative to strengthen America's position as a world leader in science and technology.

My primary purpose for being here today is to introduce the two main witnesses for this hearing. I would like to give you just a little bit of background on why these two particular witnesses are appearing here today.

SUBPANEL ON SSC PHYSICS

Last fall, faced with projected cost increases for the SSC due primarily to technical changes, the Department sought options for reducing the scope of the project that could save a substantial amount of money. Only one was found, and it was to reduce the size of the main ring, and thus the collision energies with which the SSC would operate. We needed to know whether a reduction in energy from the original design of 20 trillion electron volts would compromise the scientific goals of the project and, if not, how much of a reduction in energy could be accepted without compromising these goals.

The Secretary of Energy, Admiral Watkins, requested that a blue ribbon committee be formed to answer these questions. We brought together a prestigious group of physicists under the aegis of the Department of Energy's High Energy Physics Advisory Panel. This group, which was called the Subpanel on SSC Physics, was comprised of physicists from different fields and included five Nobel laureates.

The Subpanel considered the loss of physics capability associated with the lower-energy, lower-cost options. They also examined the technical design changes to the project proposed by the SSC laboratory.

Their report on these issues was an important factor in determining the Department's present course of action, which is to retain the design energy at 20 trillion electron volts and to make the needed technical design changes.

Mr. Chairman, I am pleased to have the opportunity to introduce two members of this prestigious Subpanel, Professors Lee and Drell. Both have received many honors, and I will only mention a few.

Professor Drell is the Deputy Director of the Stanford Linear Accelerator Center. He was a recipient of the Lawrence Award in 1972, he was president of the American Physical Society in 1986, he is a member of the National Academy of Sciences and Professor Drell served as the chairman of this Subpanel.

Professor Lee is on the faculty of Columbia University. He received a Nobel Prize in physics in 1987, he also received a Fermi Award and many other honors for his work in physics and he is also a member of the National Academy of Science.

Professors Drell and Lee briefed Secretary Watkins on the Subpanel's report. I was present during the briefing and can tell you that, not only were they instrumental in convincing the Secretary of the validity of their committee's conclusions, but they forcefully conveyed their great enthusiasm and excitement about the science to be learned from the SSC. Doctor Lee?

UNDERSTANDING THE PHYSICAL WORLD

Dr. LEE. Thank you, Chairman Bevill and Congressman Fazio. We are very pleased to have this opportunity to present our view of the importance of the SSC project.

The quest to find out what we, in our physical world, are made of is a mark of civilization that dates back to its very beginning. But it wasn't until approximately 500 years ago—about the time of the discovery of North America—that modern science was born. This came about through the realization that theories must be tested by experiment and that crucial and precise measurements can, in turn, lead to new ideas.

Through this strong coupling between experiment and theory, we are able to reduce the vast diversity of all natural phenomena into one single set of fundamental physical laws; therefore, any progress made on the fundamental laws will have its effect everywhere and in everything.

Let me give two examples.

The important observations made by Ben Franklin in the 18th century and the crucial experiments on the electric and magnetic forces by Faraday in the 19th century led to the unification of these two forces by Maxwell later in the 19th century. Through that breakthrough came the development of generators, electric motors, telegraph, television, radar, and, indeed, all modern communications.

Take another example. At the turn of our century two seemingly esoteric discoveries were made. One was the experiment on the velocity of light by Michelson and Morley in 1887 in this country; the other was the Planck black-body radiation law in 1900. The former was the basis of Einstein's theory of relativity and the latter laid the foundation for us to construct quantum mechanics.

In this century, all the modern sciences and technologies—nuclear energy, atomic physics, molecular beams, lasers, x-ray technology, semiconductors, superconductors, supercomputers—only exist because we have relativity and quantum mechanics. To humanity and to our understanding of nature, these are all-encompassing.

Now, near the end of the 20th century, we must ask what will be the legacy we give to the generations in the next century. The physicists at the end of the 1890s had a glimpse of a new vista, the existence of exciting and unexplored fundamental areas. Today we also know of the existence of an entirely new class of fundamental forces: the one that is responsible for symmetry breaking.

Of this new force, we know only of its existence and very little else. The new Superconducting Super Collider is the key that we will use to unlock the door and take the next step.

As was the case in the past, our present progress on the basic physical laws will have a similar long-range and vast impact on the technology of the future.

Since the SSC project is of so large a magnitude and so great an expense, we must ask a number of very serious questions. For example, how important is the SSC in terms of the new knowledge it will provide? Are there alternative possibilities—perhaps more modest in size and cost—for advancing the frontiers of our knowledge? And how important is it to the United States to invest in science and in high energy physics, in particular? What practical benefits to society can be expected to result from the SSC? These and other questions we must ask.

NEW KNOWLEDGE FROM THE SSC

Let me take this opportunity to address the first question, the importance of the SSC in terms of the new knowledge it will provide.

The very spirit of physics is to explore the unknown. While this makes it difficult for us to predict precisely what we will discover in the future, we are in a position to forecast the minimum payoff. Based on our present knowledge, we are confident that the SSC will explore a specific area in which major new discoveries will be made.

The SSC specifications were established with this goal in mind, and experience gained since 1983 has strengthened our conviction of the importance of constructing a proton-proton collider with the beam energy of 20 TeV and luminosity of 10^{33} CM^{-2} SEC^{-1}, as originally proposed.

As a result of truly remarkable progress that we have made during the past 20 years, we do have one clear benchmark that is crucial as a guide in setting the energy of SSC at 20 TeV. The benchmark comes from our success in unifying the electromagnetic forces with the weak forces of radioactive decay into a single entity, the electroweak interaction—commonly referred to as the standard model. This unification is an achievement reminiscent of the unification of electricity and magnetism by Maxwell mentioned earlier.

Based on our new theoretical structure for unifying weak and electromagnetic forces, the existence of masses of new particles, the W and Z intermediate bosons were predicted and confirmed experimentally at CERN in Europe in 1983. From the predictions of this theory, we are certain that exciting new phenomena must appear at the SSC design energy.

SYMMETRY—BREAKING FORCES

At present we know that there exist three different forces. One is the strong force that binds the nucleus together, Another is the electroweak force we just mentioned, The third is gravity.

Yet, we know that all these forces are based on the symmetry principles, but practically all the symmetries are broken. Why? How? That understanding at present lies outside the scope of our knowledge.

A major task of the SSC project is to understand this new class of symmetry-breaking force. The masses of all known particles break these symmetries. Consequently, an understanding of the symmetry-breaking forces will lead to a comprehension of the origin of the masses of all particles. One of the promising manifestations of symmetry breaking may be the existence of a new type of particle, the Higgs mesons. If so, then, in addition, we would also discover such new particles.

In order to make sure that we can unravel the nature of the symmetry-breaking forces, we must measure the scattering between the W and Z bosons that were discovered earlier at CERN. That we are confident can be done at the 20 TeV design energy of SSC.

The recent major advances in particle physics and astrophysics have given us the first ever experimentally-based glimpse of the history of how the universe has evolved following the Big Bang some 15 billion years ago. The very high collision energy of the SSC will recreate the physical state that existed in the universe about one billionth of a microsecond after the Big Bang. Future history books will tell that ours was a time when mankind was able to begin recreating the evolution of the entire universe following the Big Bang based on solid experimental data, not just on theoretical concepts. The SSC, together with our scientifically-productive deep space probes, will enable us to write new chapters in that history.

The search for the smallest building block that everything is made of drives us to explore physical phenomena within smaller and smaller distances, and that necessitates higher and higher energies.

The SSC energy will enable us to examine the physical space within a distance hundreds of thousand times smaller than the size of a nucleus. Since there is no comparable facility being planned anywhere else in the world, the very uniqueness of SSC insures that we will be exploring in an entirely uncharted region. It is precisely this major leap into the unknown that poses the challenge, captures our imagination, and promises the greatest intellectual rewards. This is why SSC will attract the best creative young minds in the world. It will also restore our cutting edge in both basic science and high technology.

Physics is monolithic. There exists only one universe, our universe. The multitude of forms of all matter obeys only one set of fundamental laws, and we are at the threshold of understanding that set of laws.

To nature, the same laws—physical laws—govern the motion of all particles in every aspect of their manifestation—gas, liquid, solid, living beings, planets, stars, galaxies—from the beginning of the universe to the present. In physics there is no distinction between the different disciplines of our profession. Our aim is to understand that set of laws that governs everything. SSC makes a direct route to us achieving this understanding. It will be our contribution to the civilization of the next century.

Thank you.

Mr. Bevill. Very good.

Doctor Drell?

SCIENTIFIC CHALLENGE OF THE SSC

Dr. Drell. Thank you, Mr. Chairman and the Committee for this opportunity to discuss the SSC and its importance.

Never before in my experience has an accelerator undergone so thorough a design study and review by scientists and engineers in America and around the world. Because of its magnitude, the 54 miles of superconducting magnets, the length of time to build it, the cost in dollars, and the investment in scientific careers that it involves, it is obviously very important and necessary for this review to consider what physics we will learn, to understand what technology we can apply and how well we control it and can be confident of its operation, to study what alternatives there are that may be more fruitful and less expensive, and to judge the prospects for timely and reliable operation.

We ask in all steps: is this step we are asking too bold for one to make or not bold enough, when we consider the technical challenge and the scientific payoff and the alternative choices?

Now, Professor Lee has just recounted the enormous, fantastic—as seen by physicists, anyway—fantastic payoff that we are confident of achieving with this machine and its design energy. Of course, we always hope for major surprises that reveal how much richer nature's imagination is than is ours, but even without that there are major achievements that we are confident of accomplishing with this machine. That is how it was designed.

We know we can make great discoveries about a new force and to add to our understanding of symmetry breaking forces and the mass of all particles.

What I want to review in my brief remarks is the path to the design of the SSC and where it stands now. This question of alternatives and whether the energy of the beams that we want to achieve is appropriate was addressed by the community of high energy physicists—the machine builders, experimentalists, theorists—since 1982 in a number of workshops and in collaboration with the Department of Energy through the HEPAP mechanism.

SSC DESIGN

The beginning of the SSC dates to 1983 and the recommendation "for an immediate initiation of a multi-TeV, high-luminosity, proton-proton collider project with the goal of physics at the earliest possible date."

In March 1986, a few years later, the Central Design Group for the SSC, composed of physicists and engineers, drawn from universities and national laboratories across this country and around the world, produced a site-independent conceptual design for the collider with 20 TeV per beam—that means energy in each beam which is 40,000 times the energy in the mass of the proton sitting still—and with a luminosity of 10 to the 33rd power per square centimeter per second. This is a measure of the intensity of the beams in the collider. The higher the collision rate, the higher the luminosity.

The two most important ingredients in that recommendation were the conviction of the scientific community that the technology existed to build a reliable and versatile SSC project with those specifications and that our scientific understanding provided confidence that the SSC would provide the data necessary to begin an exploration of how symmetries are broken in the basic forces of nature, leading thereby to an understanding of the masses of the particles of the matter in the universe.

The SSC laboratory in Texas has now developed a detailed design specific to the site selected in Ellis County, Texas, by the Department of Energy. This has led to an increase in the estimated total project cost arising primarily from two types of changes.

The first type involves recalculation of labor and materials costs, requirements for R&D on the magnets, and on the instrumentation to assure reliable accelerator operation and performance.

The second type of design change involves technical changes; namely, higher injection energy and a larger magnet aperture.

These technical changes were based on new information that was not known at the time of the 1986 conceptual design. Over the last two years beam measurements at the Fermilab Tevatron that are now available and magnetic measurements at the new colliding ring project under construction in Hamburg, Germany, at the German Electron Synchrotron have shown the existence of time dependence of the persistent eddy currents during injection that must be corrected. And new massive numerical simulations with supercomputers now provide us with more detailed knowledge of beam stability in these accelerators under realistic operation conditions than was previously possible.

It is based on this new operational experience and these new developments that the laboratory judged that it was necessary to increase both the injection energy from one to two TeV and the magnet aperture from four to five centimeters in order to ensure reliable operation and efficient commissioning of the new accelerator.

HEPAP SUBPANEL RECOMMENDATIONS

It was as a result of these changes—and, in particular, the increased cost, as Doctor Decker said—that the Department of Energy constituted the HEPAP Subpanel on the physics of the SSC "to provide advice on the range of useful machine parameters in order to complete the design of the facility."

It was the unanimous recommendation of this panel, which included members from other fields of high energy physics. It just wasn't pigs at the trough on this one. It was the scientific community broadly. I hope we were responsible and credible. We did our best, I can tell you. But it was the unanimous recommendation of this panel and of HEPAP, itself, when they accepted our recommendation, that implementing these design changes will ensure confidence in reliable and timely operation of the SSC.

We found on the Subpanel that the only cuts that would allow substantial cost savings would reduce the capabilities of the accelerators seriously along with its scientific potential. Decreasing the circumference would be an irreversible loss of potential and raise the specter of the only analogy I can think of—going three-fourths of the way to putting the man on the moon in the Apollo project and not being able to complete the last fourth. It would mean not having the energy to explore the region where we know we will see the evidence of the new force and the symmetry breaking that Professor Lee has described.

It was a scientific judgment that such a reduction would unacceptably increase the risk of missing important new physics, which is the very goal of building the SSC. It was our scientific judgment that we would get there at 54 miles, too.

SSC will be a unique facility well into the next century. It will represent a great step by a factor of about 10 to 20 beyond any other accelerator now operating or under construction.

CERN

Now, at CERN in Geneva they are seriously considering constructing a proton-proton collider in their existing 17-mile circumference tunnel, which is where their large electron-positron ring is now operating.

However, the SSC, with the 54-mile tunnel—three times as long—and 20 TeV beam energy, compared with the maximum of 8 for the CERN concept—it is not yet a design, but a concept—will have the unique potential to explore the wide range of physics in the energy range we believe is crucial to all our understanding of the laws today for discovering the new phenomena that Professor Lee talked about.

In this context, I can't resist commenting briefly on the editorial that appeared in the New York Times yesterday under the title "Behemoth and the Boson," which I suspect committee members have read.

Let me say it was a dismay to me to see in so responsible a voice in this country such bald technical errors in that editorial. For example, it said that, "Worst of all, nothing of scientific interest may lie in the energy range the super collider opens up."

Well, the scientists of the world have spoken many times with our best judgment that we can't help but find major discoveries. Again, it was like when the Bevatron was built. We knew that we were going to discover the anti-proton there. We were convinced it was there when Lawrence built the Bevatron and Professor Segre and Chamberlain found it. We knew we were going to find it. If we hadn't found it that was not a failure. That would have been the greatest revolution in our concepts of nature—not finding it—and it would have meant that we were on the wrong track for 30 years in all of modern physics, which would be an even greater discovery.

I think we are quite confident that this is a totally wrong statement.

Also, the editorial said, "Another attraction of the European device is that its magnets might use the newly discovered materials that become superconducting at high temperatures." As a matter of fact, the proposal at CERN will cool the magnets to lower temperatures than those used in the SSC. They are going to drive the liquid helium refrigerators down to two degrees absolute, whereas the SSC design only goes to four degrees. They have to push harder and take more risks in doing that in order to even reach the energies that their design concept talks about. So the statement is technically 180 degrees wrong.

They also comment that "American physicists could be assured of a ringside seat in this $1 billion project." It is not $1 billion. And as I have said already and won't repeat, the energy reached does not give us the confidence that we are getting into the region with a new phenomena to be discovered. It only gets one-third of the way there.

And finally—this is the one that gives me the most pain, because I come from Stanford—they say, "The next generation of machines will probably be linear colliders of the kind now working at Stanford." Well, at Stanford we love electron beams and we are pushing the linear collider as much as we can. We have an aggressive, international research program. We have many problems behind us as a result of the operation of the collider now operating there at 100 GeV. We have many problems we know are still ahead of us. We are not ready to move on.

We hope, with optimism, that in some three or four years from now we will be ready for a proposal to make another step along that line part of the way there—maybe to one-third of the TeV, which doesn't get us into the crucial area—and might be expandable eventually in that area. We are not competitive there now. We are not technologically ready to make that step.

BENEFITS TO SOCIETY

My last comment will be answering the third question in our submitted report that Doctor Lee mentioned: How important is it for the United States to invest in science, and in high energy physics, in particular? What are the practical benefits to society?

That is a judgment which we look to your leadership to make, but we can offer our opinion on it.

This is a question I have grappled with for several decades or more as a Presidential advisor on the President's Science Advisory Committee and as chairman of HEPAP, and also as a citizen who feels deeply about the social responsibility of science.

When construction of the SSC was recommended by President Reagan in 1988 and reaffirmed by President Bush last year, it was identified as a national goal. At the same time, an important commitment was made to maintain support for a strong and broad-based national program in science. We weren't going to rob Peter to pay Paul on this one.

This is an important commitment because high-quality scientists and engineers are a national resource of the United States. This technical community is a critical ingredient in our national effort to remain a world leader in technical innovation; to maintain a strong economy and high standard of living; to flourish in competitive, high-tech industries; and to meet our goals in national security.

The SSC will be an important component in training and maintaining U.S. technological leadership.

For many decades into the next century it will be a unique tool ensuring U.S. leadership, helping train outstanding young American scientists and engineers and students from more than one hundred universities in the United States in the most sophisticated and demanding new technology.

It will assure continued U.S. leadership in this field that has attracted the best scientific talent in this country for more than 50 years and has been a source of great pride, as well as a stimulant to important technical innovations in superconducting technologies and computer controls of complicated systems.

It will also be a boon and an important challenge to the highest technological leadership of American industries, whose experience and expertise will be relied on to build this 54-mile-long system of superconducting magnets and to construct sophisticated detectors that must be designed to select those few events of crucial importance out of a background of hundreds of millions of interactions occurring each second when this machine is operating.

To summarize, Mr. Chairman, the physics community—American and worldwide—is excited by the prospect that the SSC will begin to provide data by the end of this decade. Through research, training, and industrial manufacturing, the SSC project will contribute to American technological strength. It will also be a magnet for scientific cooperation worldwide. It will advance our understanding of the universe and will help define the quality of our culture.

It will, indeed, be an important legacy for us to give to the next generation of scientists for the 21st century.

Thank you.

Mr. **Bevill**. Thank you, Doctor Drell.

By agreement of the other members, I am going to recognize Congressman Chapman of Texas. Mr. Chapman?

Mr. **Chapman**. Thank you, Mr. Chairman.

Doctor Drell and Doctor Lee, thank you for your excellent testimony.

FEDERAL INVESTMENT

I would like to ask the question that I have heard from my colleague, Mr. Myers. I would ask you to put yourself in a position of a member of this Committee or any member of the House at a town hall meeting in his home district when a hand from the back of the room goes up and says, "Mr. Congressman, why are we spending so much money on this science project, this accelerator thing in Texas? Explain to me why my tax dollars from Indiana or from California or from Massachusetts should be supporting these protons going around in circles and running head-on into each other down there in the plains of Texas. Why is that a good investment of my tax dollars when I see all of these needs that I have right here at home? Explain to me what the physicists are going to learn that is going to justify that kind of investment other than just chapter 32 in the physics book which now ends at chapter 31." What do you tell that constituent at that town hall meeting?

Dr. **Drell**. We look to government leadership to make that balance between our devotion and our commitment to science and research and our recognized need to meet immediate problems of our society, and we also look to government leadership to develop an investment strategy for basic research in the future.

When we talk about basic research, we are talking about investing in the future. We do not know what we will learn at the end of the road in this type of research, but we do know from reading history that with the advance of understanding of nature has come the opportunity to use nature and its forces to better our life.

On the more material side I would answer it that way. As Doctor Lee said, modern chemistry—the modern conveniences of life, all of modern communication came into being because Maxwell in the 19th century was intrigued by the possible relation between electricity and magnetism. Out of this came an understanding of all of optics and modern communication.

Sometimes people worry that when we learn too much about nature we can abuse it, too, but that is, again, where society makes choices. Certainly understanding the nucleus and quantum mechanics gave us modern chemistry. It has given us nuclear energy which includes, on one hand, nuclear medicine for diagnostics and therapy and clean power, on the other.

So it has always been that added understanding has given us the means to use nature to our advantage.

But I would like to say there is a more romantic side which clearly means a lot to someone whose life is devoted to doing research. In the simplest form it is one of the hallmarks of our difference from the lower forms of life walking around in the forests that we have the ability to ask what we are made of. We ask these questions.

I think it was Einstein who said the most incomprehensible thing about nature is that it is comprehensible. But this is what defines the quality of a civilization and a society—that we have evolved to the point where we ask: what are we made of? Can we unify the forces of nature? There were four. As Doctor Lee told you, there are now three unified forces. We have unified electrical and weak forces together in the last 20 years. When we can unify gravity and the strong nuclear forces, this will help us appreciate beauty in nature. We are on this great adventure of the human mind of trying to understand what we are made of.

So I think there is a romantic and purely scientific side of it, but there is the practical side which I cannot answer. I don't know what we will discover. Maxwell had no idea 100 years ago what he was going to do to our whole life by unifying electricity and magnetism and giving us all of modern communications.

Mr. CHAPMAN. Is this then totally a leap of faith? Surely someone has worked the mental gymnastics of what happens if we find the Higgs. There is some model there that we can build back to in applied R&D.

I think what my constituents and perhaps other constituents want to know: what is that something? What do we do if we find it? We may not know exactly what it will be, but assume it gives us the basic, fundamental building blocks of matter, what do we do with it? Where does that lead us? I think that is the question.

Now, if we don't know the answer to that, it is difficult to justify this kind of investment on romance and intellectual curiosity. I think that is one of the questions that many of us have had. On the practical side of it, give the Members of Congress something other than romance to justify the expenditure.

JUSTIFICATION OF THE FEDERAL EXPENDITURE

Dr. LEE. I think this is an important question and a tough one. I also have the same difficulty trying to explain to my children why we should do that.

I think that the difficulty comes in the connection between basic science, and technology and application. How we use technology is like water and fish. You look at a pond of water. You may or may not see fish. But without water there are no fish.

When we explain that everyone enjoys a lot of modern conveniences—you name it. Every single one comes from the breakthroughs in basic science of our predecessors.

The SSC is our means to make the breakthrough to ensure that our next generation's great-grandchildren will enjoy the future conveniences.

Dr. DRELL. Here is one point to show how difficult it is to give a really honest answer beyond what we have done. When we discovered that there were two mesons back after World War II, the one which we call the mu meson, as well as pi, it opened possibilities, as we studied the properties of this mu meson—because it is a heavy electron. It is one of the great mysteries, by the way, in terms of not knowing its mass. It weighs 200 times as much as the electron and is identical to it in every other way. Why is it there? Who ordered it? What is it doing?

It turned out that the mu mesons lived almost long enough and this was a study triggered by some experiments by Louie Alvarez at Berkeley to produce a very clean, cheap source of energy because the mu meson triggered fusion. It missed just by a small fraction because the forces of nature were strong enough for the mu meson to not live quite long enough.

We can't answer your question about practical applications until we know what the properties are of these building blocks that we are still looking for and whether they turn out to live long enough or not live long enough or what we can do to combine them. We almost have really cold fusion of a very clean and cheap source. That is an example of one that got away. But we can't answer that until we make the discovery.

FOREIGN PARTICIPATION

Mr. CHAPMAN. Give me your judgment in the area of basic science research: first, the advisability of foreign participation in the project, secondly, the level of foreign participation. Be as specific as you can about the aspects of the project, for example, the magnets, the cryogenics, the bricks and mortar. What components of this project should—we should consider for foreign participation?

Dr. DRELL. Let me make a running start by saying that in this field for the past 30 years, ever since it got to be a big, expensive field, there has been extensive foreign cooperation in building detectors, in analyzing the data, and in participation of the young researchers. So we are familiar with extensive collaboration with countries around the world. And there are American scientists who are exploiting the large electron-positron collider at CERN now. There are European, Japanese, and Chinese physicists—physicists from all over the world—working at our accelerators.

So there is already in the design and the development of the detectors, and in doing the physics, extensive collaboration already. There is a very integrated program.

One of the important points is that foreign collaboration is very important here for the quality of the program, and also, because there will never be another machine like this. This is going to be a machine where the scientists of the world would work and presumably we will collaborate on another machine in another area, which is built in another country in the world. So it is a very healthy relationship.

AMERICAN BENEFITS

I suspect that one of the benefits to the United States of building this machine is going to be the very severe challenge for high-technology manufacturing that it is going to be put to American industry, and that American industry is going to be, if not the exclusive, certainly the major builder. That is where the challenge of this field will, I think, most directly and immediately impact society as a spin-off; namely, the task, the challenge, and the standards required of American industry to make 54 miles of reliably operating superconducting magnets with refrigeration, with timing synchronization as the beams circulate around to ten-to-the-minus-ten seconds and fractions of nanoseconds accuracy, the electronics, the manufacturing control required—I think that in many ways, as we have seen similar requirements in the space program.

So I suspect that however it works out in detail—and I would rather defer to Doctor Decker and DOE for any more details than I am qualified to answer for you—a major, major boon will be a result of the manufacturing being done in this country because it will be a challenge to our industry.

SCIENTIFIC COMPETITIVENESS

Mr. CHAPMAN. Assume we successfully accomplish the manufacturing technology. What do you see—and perhaps this might be a more appropriate question for Doctor Decker, how do you see the successful accomplishment of that goal helping us? How does that help American industry? How does that help competitiveness?

Dr. DECKER. I think certainly in the manufacturing of the magnets that very precise manufacturing is required, good quality control, and so forth. Those practices are important, obviously, for a lot of other products, as well. Industry will also participate in the development of detectors for the experiments that will be done on the machine. This is, I think, really the first time that the American industry has gotten involved in consortiums that put together detectors. There is a lot of very sophisticated electronics required in those detectors.

Those are just a couple of examples where I believe that this project will be very beneficial in bringing up the capabilities of U.S. industry.

Dr. DRELL. Advances in the superconducting field so that we can transfer power with less energy loss will be, I think, a major step in our industrial future. We have already in big science spurred the advance of superconducting technology in the rings that already exist at Tevatron.

Dr. DECKER. There is one thing that I could add. We are already seeing some benefits. From having done the R & D for the Super

Collider, we have done quite a lot to develop and improve superconducting materials. Those new superconducting materials are being used in magnets for magnetic resonance imaging devices.

Mr. **Chapman**. And that is some technology or knowledge that has been learned in this program?

Dr. **Decker**. That is correct.

Mr. **Chapman**. It has already been transferred into, in that case, the medical field?

Dr. **Decker**. Yes.

Mr. **Chapman**. Medical equipment.

Dr. **Decker**. That is right.

Mr. **Chapman**. I have other questions, Mr. Chairman, but I know there are several Members here that would like to ask questions, so at this time let me yield back my time.

Mr. **Bevill**. Thank you.

The Chair recognizes Mr. Myers.

Mr. **Myers**. Mr. Chairman, our ranking member, Mr. Conte, is here. I know he has other committee responsibilities, so at this time I would like to yield to him.

Mr. **Bevill**. The Chair recognizes Mr. Conte.

INCREASED COST ESTIMATE

Mr. **Conte**. Thank you, John. I appreciate that.

Good morning, gentlemen. Thank you for joining us today. It is a very interesting subject.

Gentlemen, there is no doubt in my mind that the search for quarks and bosons and Z particles is very exciting. It is exciting for all of us—and for physicists, such as yourself, I imagine. But I find that a number of Americans are coming to regard the SSC as a super-expensive super hole, a money pit for the 1990s.

Critics who understand the project—and they are very few—don't generally berate the SSC's objective; rather, they are vitally concerned about the project's cost.

What I don't understand is why the physics community considers SSC to be such an urgent project. Why can't we delay construction of the SSC until our fiscal house is back in order? Have physicists run out of things to do in this country?

Newspapers such as the Washington Post and New York Times have editorialized that the SSC is too expensive for this country to build at the current time. These papers are not known for their fiscal conservatism. Even the Dallas Morning News wrote, "It is incumbent upon the Department of Energy to hold the super collider project to stringent financial guidelines. Revision in the design plan that would increase the cost of construction by nearly 30 percent cannot be accepted in these times when runaway deficits are rampaging the Federal budget."

As you know, Admiral Watkins appeared before this subcommittee earlier this month to defend the Department of Energy's budget request for fiscal year 1991. In response to my question, the Admiral acknowledged that there is an upper limit to the SSC's acceptable cost. However, he declined to identify that figure.

In testimony before another House committee, Doctor Allan Bromley, the White House science advisor, also agreed that there is a point at which the SSC becomes simply too expensive to build.

My question is this—and I'm sorry to talk so long. I now sound like a professor. [Laughter.]

Mr. **Myers**. No pun intended.

Mr. **Conte**. Is the physics community at all constrained by a sense of fiscal responsibility? Do you agree that there is a point at which the SSC becomes too expensive to build? If so, what is that point? Would you support construction of an $8 billion machine, a $10 billion machine, a $15 billion machine, or a $20 billion machine?

Dr. **Lee**. I am sure that you will find the physics community, in response to your particular question, will not have a unified answer. I can only give you my personal opinion, and Professor Drell will give his.

I think the original approval of the budget is $5.9 billion which is a good reference point.

The cost escalations, which I believe are really, as Professor Drell said, two types. One is due to the actual evaluation of labor. I believe this, with the very strong hand of DOE and the SSC laboratory, they would try to hold the costs down. And then there are also the technical changes due to new knowledge—you see, at the time when the conceptual design was made, there were not any large-scale superconducting magnet accelerators. So with respect to the stability of the estimates, these are new inputs.

Also, we are now using supercomputers. We can calculate our requirements in much more detailed. Therefore, this resulted in the two technical changes—the change of magnetic aperture from four centimeters to five centimeters, and also the change of the injection energy from 1 TeV to 2 TeV.

So far as I know, these technical changes are not a very large fraction of the original—on the order of something around 12 percent or so. Maybe Doctor Decker knows.

TECHNICAL DESIGN CHANGES

Dr. **Decker**. The technical design changes are responsible for about two-thirds of the total cost increases.

Dr. **Lee**. So, in my opinion, this is legitimate. In fact, because this machine will be so unique to our voyage to the future—it is not just—Congressman Conte, as you made reference W and Z, that are very interesting; yes, that is very interesting to physicists, but what we are talking about is an entire new class of forces.

Up to now there exist only the three in the whole universe—strong force that binds all the nucleus together, the electroweak force which we have just recently unified over the last two decades, and gravity. But we now know that there is a fourth class.

You ask what is so great about that. Let's look at our universe. We know there is nuclear energy, fission energies, fusion energy. But we also know there is another great source of energy—quasars. The quasars that exist now—a few thousand catalogued in detail. The source of those quasars—it is essentially the whole galaxy, the whole mass just to give the energy.

Mr. **Conte**. I agree with you, but we don't have the money. That is the whole problem. That was my question. That is what I was trying to drive at. Where are we going to stop?

This morning I had one of your friends from academia into my office, Doctor Gray. Have you ever heard of him?

Dr. **Lee**. I know him.

Mr. **Conte**. Yes, you know him. The president of MIT. You know what he was complaining about? Stanford is complaining about it also. I am going to try to help him. But our science fellows now are getting $6,500. MIT is losing $3 million a year. Why isn't the Science Foundation given more? Under the law, they can't contribute anything themselves—the fellows can't. So the universities like MIT and Stanford are losing $1 million a year. Why are they given only $6,500? We have no money.

Down the hall, two doors down, is the Subcommittee on Health and Human Services. We can't even recruit a director for NIH because of the salary. We have not recruited a scientist—listen to this—we have not recruited a scientist for ten years. How are we ever going to find a cure for cancer and heart and lung disease and diabetes and arthritis and digestive disease? Last year, alone, we lost 36 scientists from NIH to the Vince Lombardi Cancer Institute over in Georgetown.

That is what we, as practical politicians, are struggling with. Can we afford this luxury at this time? Maybe down the line when we get our house in order we can.

Let me ask you this: is it true that we are currently making major scientific advances in technology such as superconducting materials that are vital to SSC? If so, doesn't it make sense to wait for the discovery curve to level off before we rush headlong into construction of this very expensive machine, the SSC? In other words, isn't it possible that we will either build a machine that is obsolete before it is completed or invite major cost overruns in order to incorporate new technologies as they are developed?

SCIENTIFIC ADVANCES IN TECHNOLOGY

Dr. **Drell**. Mr. Conte, the eight-year-old process of review that has occurred starting in 1982 which came forward eventually with the SSC recommendation has been addressing as many of these questions as we can and trying to get the best answers. In particular, on this last one about new technology of high-temperature superconducters, one does not see material on the horizon at the moment that has the strength, the uniformity, the properties necessary to make big magnets. There was more optimism a few years ago. We are now on the more realistic side of the problem as we still try and understand the phenomenon and still work with materials.

So I think the answer there, the best scientific judgment from all fields of physics that I know, is that there are no materials around the corner.

And certainly I think I commented before you arrived on the New York Times editorial, which commented about this possibility in the CERN machine, is a scientifically incorrect statement.

To go back to your first question, how much can we afford to pay, when I was asked by Doctor Decker to chair this panel and we met, I want you to know I had an open mind. I didn't know where I was going to come out. I didn't go in there as an advocate.

One of the things that helped make me an advocate, aside from my scientific commitment—clearly I come with a very strong prejudice in my views with enthusiasm for science — it was that I came away with a much better detailed understanding of how well designed this machine is now so that I don't think we have to expect any major increases in cost in addition to the one on the table. If I thought there was uncertainty in the present design with regard to the technical properties or what not, I would not have written and signed and I don't think the panel would have written the report that we did.

INVESTMENT IN THE FUTURE

I think you are looking at a machine which you should view as being scrubbed so well now and reviewed and incorporating the latest operational experience that this is a conservatively designed machine. I am confident of that. It is not a matter of further escalation. It is a matter of the original question, which is the hardest question of all and which is why we have this great Congress and this great Executive Office in the country—the judgment between the immediate problems of society and the investment in the future and the quality of life. As citizens, we all stand before that judgment and we all have our own view.

I feel that I can't say my judgment is independent of the plans I come with. I have made my judgment and my conscience says clearly that investing at this level in the future is something that great countries do. It is just the way I felt that a great country says yes, there is a challenge to put a man on the moon. I didn't know what was going to come out of it. It was just something that sounded right to me when it was announced 30 years ago to put a man on the moon.

There are things that you just feel that great cultures and great societies do, and I feel that being in the leadership, as we have been for 50 or 60 years now, in the quest to seek nature's building blocks is one of the hallmarks of a great civilization and a great society. Whether we can afford it, given the other problems—which I don't in any way diminish—is a judgment. But I do not view this as something I support if it is going to rob either other fields of science or other important society needs. It is a question of putting the whole package together of the investment and the maintaining of what we have.

Mr. CONTE. I want to compliment you. That was a very fair answer. I just happened to come down the other side.

Dr. DRELL. I understand that.

Mr. CONTE. I want to see a young scientist come up and grow up to be like you. If we don't have the money to educate them out there, we are not going to have them.

I have more than abused my time, Mr. Chairman. I want to thank you ever so much. I have a lot of questions. I will submit them. I hope you can answer them leisurely.

Mr. **Bevill**. Yes. You will answer those on the record, then, please.

The Chair recognizes Mr. Fazio.

WORLD LEADERSHIP

Mr. **Fazio**. Thank you, Mr. Chairman.

I want to thank particularly Doctor Drell and Doctor Lee for their eloquent testimony today and the sincere dedication they exhibit in the way they have approached this question. I don't think there is a tougher one facing the Congress, and I really don't believe there is one that really forces us to, as Mr. Conte has, really confront the tradeoffs. We like to say we are a great country. I think we may not be at the moment, frankly, because we are a very wealthy country and yet we are leaving a whole series of problems unattended. Mr. Conte mentioned a number of them. I don't want to put one ahead of another for the moment.

The question is really whether we still want to provide world leadership or are we going to fail to provide our own political leadership, let alone the scientific community's leadership. That is really what it is about.

Is there a challenge to go to the moon as well as coming up with the money to pay for it, as John Kennedy provided? Or is it just something else we would like to do and we kid ourselves, frankly, into thinking we can not rob Peter to pay Paul. In fact, I don't know how we avoid robbing Peter to pay Paul.

Let me ask you, Doctor Drell: what if we can't improve the Fermilab or SLAC facility, as I am sure we are going to be asked to do, to add to the length of service from those very valuable scientific institutions? What if we could not come up with it? Even if we were to get the additional revenue, we are never going to have an unlimited amount. So come right back to the high-energy physics field, itself. What if we couldn't, if we went ahead and built the $8 billion-plus collider, afford to extend the service life of those two facilities? What do you think would be the result of that? How much would we gain or lose proportionately?

HIGH ENERGY PHYSICS

Dr. **Drell**. My enthusiastic support of the SSC is based on the premise that the entire base program in high-energy physics—which, among other things, is attracting the best minds which we need to work on the SSC and without which the SSC wouldn't be a success—that we are going to maintain a healthy base program. This was the premise in the Administration's submission and, in fact, we are. Right now HEPAP has a panel under Professor Scully at Columbia visiting all the labs and trying to put together what would be viewed as a strong, healthy base program in the field at budget guidelines which are essentially flat, maining so that we are not destroying the program.

But if you put it to me should we destroy the base program—close Fermilab, close SLAC, close Brookhaven, close Cornell, and——

Mr. **Fazio**. Or just turn them into toys.

Dr. **Drell**. The answer is no. That is not the boundary condition on——

Mr. **Fazio**. Good.

Dr. **Drell** [continuing]. Which I support the SSC.

Mr. **Fazio**. That is an honest and very candid answer.

Doctor Lee, do you want to respond on that?

Dr. **Lee**. I agree totally.

Mr. **Fazio**. Jim, do you think that is what is in store? Is my postulate way off base? You are a guy that wrestles with the fiscal priorities in the high energy physics area and scientific research, generally. What do you think? You know what OMB tells you every year when you march over there.

Dr. **Decker**. Yes.

Mr. **Fazio**. That is the beginning of reality crashing in.

Dr. **Decker**. That is true. No, we have supported the SSC with the idea that, in fact, we would not do it at the expense of destroying the rest of the high energy physics program. That has always been the idea from the beginning.

These facilities that we do have will in time not be forefront facilities. So there will be a migration away from those facilities by the scientists, themselves, in time to do experiments on the SSC. So we certainly anticipate that there is going to be sort of a natural evolution in the high-energy physics program towards the SSC, but exactly how that occurs, of course, is difficult to predict, because it will depend, to a large extent, on the excitement of the science that is going on at a Fermilab, at SLAC during the next few years.

Mr. **Fazio**. But regardless of the level of excitement, I am sure we are going to get proposals to do even more exciting things at those facilities. I don't know what they will cost. I have no idea. Perhaps others do.

Dr. **Decker**. And there will be hard decisions as to whether or not the——

Mr. **Fazio**. But are we making a decision today that may preclude, frankly, those hard decisions from being made? That is my concern. Are we going to have the fiscal flexibility to come back and take a look at those alternatives or are we going to just be told by our colleagues "You've got a big bundle of bucks for the collider. Go away and be satisfied?" I can imagine that would be the fallout. High energy physics would be asking for an even larger and larger share of the scientific budget of the country proportionately.

Do you want to comment? I know your biases, but I also know you are an objective man.

Dr. **Decker**. Well, so far let me say that within the Administration, at least, we have had good support for the idea that SSC not come at the expense of other areas of science, including the high-energy physics program. I certainly can at least talk to the history of the last few years that, in fact, the SSC, if anything, has been beneficial in the sense of protecting the rest of science.

I expect that that kind of commitment will continue, but you and I both know, having been around this town for a while, it is hard to exactly predict the future.

RESEARCH AND DEVELOPMENT

Mr. FAZIO. Well, I guess we are talking in terms of the revenues that never arrive.

But let me ask again the question of how we got to the point of adding $2 billion to this project which we began to fund for construction in 1990, the Fiscal Year we are currently in.

We started spending $20 million a year, and we spent it for four Fiscal Years in a row—1984, 1985, 1986, and 1987. We ratcheted it up in 1988 and 1989 to the total of about $210 million before we began construction.

I think this committee assumed that with that amount of support, the kind of funding we provided, we would have a pretty finite concept of what we needed to spend for construction of this facility.

Now, I believe I have heard both Doctor Drell and Doctor Lee say that there was no way that all that money could have provided us with the ultimate design. Would you speak to the issue? I know we have talked about doubling the energy of the injector. We have talked about widening the aperture of the magnet. We haven't talked about the length of the magnets shrinking by two meters, and therefore requiring additional magnets. But those three changes which you indicated to Mr. Conte will add two-thirds of this $2 billion add-on. Are those all things that were totally beyond our ability to understand prior to 1989? Were all of these other dollars in effect spent without having all the scientific knowledge in place? I am talking now as a bureaucrat, not a scientist. I am putting that hat on you. [Laughter.]

Dr. DECKER. Okay. I'll answer in that spirit.

Mr. FAZIO. I would appreciate it. I may be able to understand it better.

Dr. DECKER. We thought that with the amount of money that had been spent on R&D through the period that you talked about that, in fact, we did have a very solid design. We came forward and I think said that to the Congress.

Mr. FAZIO. I think most of us remember.

MAGNET DESIGN

Dr. DECKER. And, in fact, we did get some technical surprises with regard to phenomena that we had not realized were so important in superconducting magnets. It was that information that we could learn through the operation of the first superconducting accelerator of Tevatron out at Fermilab and also the magnetic measurements that were made on the magnets that were built for the HADRON machine in Europe that caused us to realize that we did have to make these two design changes.

The additional information that Doctor Lee talked about, too, is that we were able to do much better, much more accurate computer calculations of particle orbits in the main. We were able to follow those particles for a much longer period of time.

It became clear that with these problems in superconducting magnets which, to some extent, spoil the quality of the field. We just had to go to the higher injection energy and the larger aperture.

So it really was new information. We were not really aware of it in the Department until this fall.

Mr. **Fazio**. I notice the Department was making statements that not one penny more than $5.9 billion. You have come off that, obviously.

Dr. **Decker**. We were trying very hard to encourage the laboratory to keep the price down. Obviously, we are very much concerned about the cost.

Mr. **Fazio**. Yes. What about ~~the~~ other one-third of the $2 billion? Where does that come from?

Dr. **Decker**. That comes from re-estimating the cost of things like manufacturing the magnets and different assumptions between the central design group that did the original cost estimate and the laboratory—things like labor rates. The laboratory has relooked at the kind of labor that one needs and has concluded that the labor rates in the estimate need to be higher. That was a significant factor.

Mr. **Fazio**. Those were things we couldn't have foreseen?

Dr. **Decker**. Maybe we could have done a better job. In an area like that we probably should have done a better job.

FOREIGN PARTICIPATION

Mr. **Fazio**. I would like to ask our two scientific experts if they would comment on the large HADRON collider the Europeans are talking about building. There is obviously a certain point of view in this country that says that we need more international participation not only to fund this, but perhaps more investment on the part of the scientific community around the world would generate similar kinds of breakthroughs at far less cost. Do you have any confidence that the Europeans can construct this collider for the $1 billion that has been cited, Doctor Drell?

Dr. **Drell**. I don't know what the meaning of that number $1 billion is, because there are a lot of other things that go into stating the cost of a design concept. I'm not sure but I doubt that the cost of the CERN staff, all the labor costs, are included in that. That may just be equipment costs.

The trouble is that we are dealing with a concept, not a thoroughly scrubbed design. As we have just been describing, things do happen that are unanticipated when you go from concept to a full design. The one thing they have going for them is that the tunnel has been built already and that the laboratory infrastructure already exists.

Mr. **Fazio**. Right.

Dr. **Drell**. And that is somewhat of a saving. Again, it is a matter of some judgment whether that step of about one-third the size, one-third the energy—we will learn from it. Clearly it is an important step, and when the final design is in and cost is in it could very well be a good move for them to make.

But the thing we tried to emphasize and that Doctor Lee focused his testimony on is that unless we can reach the area of producing interactions in the 2 TeV region, we may find that we go, as I said earlier, one-third of the way to the moon.

Mr. **Fazio**. Yes.

Dr. **Drell**. We may get big surprises there with the HADRON collider, but we know we will be covering the waterfront on our machine That is why——

Mr. **Fazio**. Why would they proceed if they felt we were going forward with ours? Why would this be a logical step for any high-energy physicist?

Dr. **Drell**. We have to let them speak for themselves. Doctor Rubbia came and we asked him this question at our hearings down in Texas and he sees the mix of purposes—I think I am portraying him accurately—of using funding that he had, and opportunities to challenge his machine-builders and engineers so that he doesn't lose them. There is the——

Mr. **Fazio**. It doesn't sound like it is being driven by science.

Dr. **Drell**. Well, it is driven by science in the sense that they see that—first of all, they will cover a new area. They will be reaching into an area that is not explored. Secondly, it is a bet. Their bet is that with higher luminosity, with higher interaction rates—which restricts the kind of detectors you can build because of radiation damage to the detector when you have so much current clashing in these high-luminosity machines—they will still have a special purpose detector, sort of an iron-shielded ball out of which muons can come and that by looking at one class of reaction they may get some important information. They may very well. I hope so.

Mr. **Fazio**. Yes.

Dr. **Drell**. But it is somewhat of a gamble.

Mr. **Fazio**. How would you measure that bet versus the risk that we are taking if we proceed on the SSC?

NEW SCIENTIFIC KNOWLEDGE

Dr. **Drell**. I hate to say that we are not taking a risk, but to the extent that is discussed in the report and emphasized in Doctor Lee's statement, I think that there is no way for us to avoid ten years from now, with the SSC operating, having achieved fundamental new knowledge of the most basic force. Whether it comes in the form that the weak interactions grow strong or in new bumps or resonances, I don't know. But without that data we can only speculate where mass comes from and how symmetry broken. But there is no way we can miss getting fundamental, new information. That was the main conclusion of our report.

Mr. **Fazio**. Doctor Lee?

Dr. **Lee**. We know there is an entirely new class of forces there. SSC, from the very beginning, is designed to explore that region, whatever forms that may take. It is only in the very special case that, number one, low mass exists. It has to be low mass. And also the detection is really to emphasize the muon particular channel.

So its analogy would be like, if you have a whole continent to explore and you have the ability to build a jeep, you may also have to take a bicycle. Now, if that is all you have, you may get something. That is the attitude of our agency. That is what they would do.

Mr. **Fazio**. It depends on how good a compass you have, I guess, or how strong your legs are.

Dr. **Lee**. That's right.

Dr. **Drell**. If you don't know where to go the compass doesn't help you.

Mr. **Fazio**. Thank you, gentlemen, very much. I think your testimony has been very helpful.

Mr. Chairman, I will put the rest of my questions in the record.

Mr. **Bevill**. All right, sir.

The Chair recognizes Mr. Myers.

Mr. **Myers**. Thank you, Mr. Chairman.

Most of the questions or issues that I have been concerned about have already been discussed.

The thing that does disturb me is the growth in the cost—and we haven't even started. This Committee and the Congress has learned through the years that once we start a project, we do see it grow and change. But I think this has grown more rapidly than any that I have ever seen in the years that I have been on this committee. Mr. Chairman, you and I have been around for several years. But that does concern me very much. And we ain't there yet.

The reasons for the increases given here also concern me. We do have to go before the electorate every two years. You say we need government leadership. True. But the electorate has a way of changing that leadership if we don't please them. Doctor Decker, if everything was kept on schedule, when would this machine be operational? What year?

Dr. **Decker**. If I remember correctly, it is 1998.

COMMITMENT TO THE SSC

Mr. **Myers**. So we would go through at least two more Presidential elections and a lot of Congressional elections. The attitude of the country could change, the attitude of the Congress could change, and certainly the attitude of the Administrations could change.

This committee had experience with a number of programs, including the fast breeder reactor. We started with good intent, had a lot of support—industrial support—as much or more than the Superconducting Super Collider. But future Administrations, because of their overlap, lost interest in it and killed it. This concerns me about SSC. When the American people hear more and more and have more and more articles such as the one in the New York Times yesterday questioning the advisability and the wisdom of such a venture that we might lose our fervor and our interest. That would kill it off, too. But that is something no one knows.

I can appreciate you gentlemen here who are physicists, the excitement and the adventure of something that some people in the back of their minds have wondered about, just as we wondered about what the moon would be like if we ever got there. I know as kids—two of you are about the same age that I am—I remember Buck Rogers in the funny paper. We dreamed it. We thought that, silly. That can never happen. Most of the things of Buck Rogers are realities now because of science and because of research. As the chairman and everyone has said, this committee certainly has supported science and research to the ability of the American people to pay for it. But there is a real concern today.

I question whether we can afford to support it as much as we might like to. When you say "It will be a magnet for scientific cooperation worldwide; it will advance our understanding of the universe and will help define the quality of our culture," it will, indeed, be an important legacy for us to give to the next generation of scientists of the 21st century. These are all facts. It is all true.

But, as Mr. Conte has said here, our American people are suffering every day to come to grips with—putting shoes on their children, feeding them, putting clothing on them, giving them a proper education so they can be the scientists of the 21st century. And in many cases we are not fulfilling that.

And so it is a job of the leadership, and if we are part of that leadership it is something we have to come to grips with. But we have to be around long enough also to be able to solve those problems or there will be some new faces up here and you will lose it one way or the other. So we have to have when we go to the floor of the House, and go to conference with the other body, we have to have good understanding. We have to have good reasons why we should build this.

Quite honestly, just satisfying the curiosity of some scientists and keeping that scientific base, as advantageous as it is, is not sufficient. The American people really don't care whether the scientist stays on science or is out there digging a ditch some place. Most people are very concerned about their own plight.

So we politicians have to be concerned about that. I, at this point, have not been satisfied that we really see something other than just a great adventure.

Now, Queen Isabella had to hock her jewels to borrow enough money to send Columbus here, but I don't know anybody that is willing to hock their jewels right now to pay for this. We are asking the American people to dig down a little deeper, and I don't think any American people I have met with—or very few—who are willing to pay higher taxes. Most people feel like they are paying enough. So we have to squeeze out within the existing tax base. This is a serious problem that we are facing this year.

Mr. Chapman and we have all talked about this. It is going to be a problem, and an increasing problem every year. I think we have to start off with a good base.

But the thing that concerns me is the fact that we have changed this so much already and we haven't even started. We have made at least three changes: the size of the diameter injector has increased, the aperture for the magnets has increased, and the size of the magnet, itself, is reduced but there are going to be more of them. That makes three changes. How many more changes will be made in the process of construction?

One of the things that made for the downfall of the fast breeder reactor was the fact that we kept changing it so much that we could never quite build it.

I remember as a kid—I have told this committee this. In September the new automobiles used to come out. I used to go to my dad and say, "Dad, let's get a new car. New ones are coming out this month." "Well, we haven't got our crop out yet. We'll have to get the crop out."

So in November we get the crop out and in early December I'd say, "Dad, let's go get that car." "Well, we have got to wait now until the first of January. We can't sell that crop because of taxes. We'll sell it in January."

Well, in the middle of January we'd sell the crops and I'd say, "Dad, let's go get it now." "Well, we can't own a new car now because in Indiana the assessment comes in the first of March. We don't want a new car the first of March."

Well, the first of March would come and I'd say, "Dad, let's go get that new car." "Well, now, you know, we've just got so much money in the bank. We are going to have to use that to plant the crop."

We'd get the crop planted and I'd say, "Dad, let's get a new car." "Well, now, we haven't got that crop produced yet. We have got to wait and make sure we get a crop and get it out."

After about 3 or 4 years I realized Dad was stalling me. [Laughter.]

We were always waiting for a new one—the new model. That concerns me also. The new model never gets here.

By the time you break ground for this thing science is going to be finding a new idea. I don't think trying to keep up with the rest of the world is a very good justification for the project.

My question is: Everything we do in this committee has to meet a benefit/cost test. That is what we are really asking. Every day we are learning about new cost, but this could not really stand up to the benefit/cost test. I have been concerned that, while there have been some critics, they are not the same critics as we get ordinarily when we are going to build a new dam or a new bridge some place. We always are questioned by the environmentalists—self-appointed environmentalists—about how we can justify the benefits compared to that tremendous cost. Those same people have never questioned the SSC. But other people have questions. Again, how can we ever meet the benefit/cost test that this committee constantly has to prove? I just don't see it. As much as we would like to do it, I just don't see it.

Dr. DRELL. Is that a question to answer?

Mr. MYERS. It could be a question. It will remain a statement unless it is answered.

BENEFITS OF THE SSC

Dr. DRELL. I understand the issue and your presentation of it. The only comment I can make is that some of the direct benefits one can speak of more specifically is in terms of the contribution to the advancement of high-tech industry, the development of skills in industry which have always proved important. When we see we are losing them overseas, we get very worried.

So a challenge of this very high-tech type to our industry to produce this equipment, to be able to pick out an event out of a hundred million per second or to reliably operate 54 miles of magnets, I think that is one of the specific types of benefits that can be seen.

How you value the benefit of the knowledge, that is, of course, an extremely difficult question. One way to try to take a small step toward answering it is to recognize that success of a sophisticated, high-technology venture depends upon having the very high-quality brains behind it. You must draw the best students.

One of the ways that we are going to excite the best brains of the country as students is to give them the opportunity. They are going to be drawn, as they have been for the last 50 years, to this exciting frontier field of work. What benefits are there? It is not too far back in history that it was the scientists at the frontiers who, when the country needed them in World War II, were there as a resource for discovering radar—which had even more impact than the atom bomb, for radar was such an influential part of the American war effort in World War II.

So I think it has been understood by many that a strong, healthy scientific establishment is a resource in time of need—not just for what it does to push the frontiers of industry, as we hope, but in times of national need—is also something that we sustain. Part of preserving that resource is by exciting the scientists with the challenge and the new data—the opportunity to work at the frontier fields.

I think I can give all these arguments, but there is no way of making them compare in my mind with the importance of just coming to a value judgment of the new knowledge and the understanding of the universe. I think that absolutely in my mind that would still be the number one driver. That's the way I see it.

Mr. MYERS. Well, it is a very real problem. I think you recognize that or you wouldn't be here. It is true that the buck will stop here, I guess, or start here. I don't know which way it is going to be. It is a very real problem.

Mr. Conte in his questions indicated that the nation is dealing with many issues. AIDS is getting a lot of research dollars. It is a concern to all in the country. We still lose over half a million people a year from heart disease. We lose about 100,000 from stroke. We are losing about 50,000 from cancer.

Now, is there any hope that from this device that we could find out what causes cancer? Is there any chance that we can offer something like. Is there hope that we could get something practical for the average citizen? Is there any chance of something like that?

SSC COST

Dr. LEE. Congressman, I think your questions—I am also troubled. In fact, before I was called by Professor Drell to the Subpanel—see, I am working on superconductivity. In fact, I was quite out of touch with the entire cost and the problems of SSC. So it was about the end of last year I was asked if I could participate in this Subpanel to look at cost and they said there would be a cost increase. I was surprised. Why is the $5.9 billion not enough?

So I went and there were a number of high energy physicists and then more people that were not high energy physicists. But we looked at the reason for the changes that were given on the basis of the original design and original support and original condition that it will not impinge on the other parts of either the scientific research or other programs of the government. Then, is this change due to new knowledge and would there be another escalation due to other knowledge you don't know, for example?

Then, after very careful examination, we are of the opinion that these changes are necessary. Not only necessary, they are sufficient, because now we know in full what will happen. We know the laws of physics. So this budget increase will provide you a reliable and flexible machine on time. It will explore, among other things, this new force of which we don't know the nature.

But this explanation is, of course, not sufficient. If you ask if we will stop this project in the light of the homeless problem, then maybe the answer would be that we should stop this. But I can only express my own reason.

So by very careful study, I do not believe the cost should increase. This is a reliable, totally solid thing that is being done.

Mr. MYERS. There used to be a Senator who made a reputation of identifying what he called "boondoggles." I hope this is not one of them. That is the thing I think we are concerned about—how we are spending the taxpayers' money.

I spent a lot of time here and I apologize to my colleagues. I don't know how we are going to come up with any more money. As Mr. Conte was questioning, that would be a case of what we used to call in football "piling on." I think we have got to be very careful, Doctor Decker, about this. I think if it does survive it sure can't survive any more increases. I am quite confident of that. I think it could be in jeopardy now. I think we all recognize that is the reason we are here today.

So I do thank you and thank my colleagues.

Our chairman is a great story teller. I will tell one very brief one. I am impinging upon his prerogative here. If the election would just come out right I would trade chairs with him.

Mr. BEVILL. Tell us a new one, John.

Mr. MYERS. When I worked for a living back years ago I ran a little country bank and about this time of year I used to have what they called an outlook on agriculture. I would invite people down from Purdue University. Earl Butz—you all remember Earl Butz, a great story teller. That also was his demise, if you recall, but I'll not tell his story. But this is a true story.

I had Earl down and—he was just Earl back then. He had a doctorate, though, and I introduced him to a bunch of farmers. I said, "This is Doctor Earl Butz from Purdue University." And so Earl gets up and he goes off on his four or five stories and I sat down in the front row. There were a couple of farmers there. One farmer punched the other one and said, "Is that fellow up there a real doctor?" Someone said, "Yes, he is a real doctor, but he ain't the kind that can help you any." [Laughter.]

What kind are you fellows? [Laughter.]

Thank you for your testimony.

Mr. BEVILL. The Chair recognizes Mr. Pursell.

EDUCATIONAL OPPORTUNITIES

Mr. PURSELL. Thank you very much.

We have gone over all of this and I am not going to talk about technical issues. I am interested in the educational component. I look at the math and science education in this country and it is enormously deficient. In the elementary and secondary school studies I have looked at at the University of Michigan—a study of Taiwanese, Japanese, and American students—we are finishing dead last. They are spending twice the time in the classroom on academics as we are, and that is a long, serious problem for us.

I really think this component of SSC should have a strong educational component for high schools, graduate students, and even elementary students. I understand Texas is building a strong component in the elementary school system dealing with the SSC. I really think that is an added dimension to help sell this program. I am interested in it from an educational standpoint as well as the basic science and hopefully applied sciences aspect.

One of the concerns I have, however, is that the consortium—I think there are about 77 universities now involved in that consortium—some of those universities obviously are looking to have a piece of the action. But I think there is a bigger dimension—is there a way that we can creatively involve the national student body at all levels to be able to participate through monitors and computers in the super collider for the 21st century? To me that is a very important goal of this nation. I know our Secretary of Energy has talked about education in science and math. Does anybody care to comment on that dimension?

Dr. Drell. I sympathize, Congressman Pursell, with your statement very strongly. I have said at various times in simple terms that science and math teaching in this country has become a disaster area. It is a shame. I am very pleased that Secretary Watkins has taken such an active role in science education. I think it is very important. Fermilab has been a model laboratory in reaching out in the areas around it in educational programs at all levels. We have done things at SLAC about trying to reach the community and the school children with what we do.

Advice not asked for, but which I feel would be welcomed if Congress were to task the national laboratories to play a major role—I shouldn't say "major", but to be active in a way which could be productive and worked out by wiser people in education. I believe it would be a good thing. I think these laboratories should, because I think there is a very serious national problem maintaining scientific literacy in this country or even achieving it. As our society gets more complex, we are going to have to have literacy in the scientific and technical dimensions of our electorate leaders. I think that is the way we are going in life. If we want to be a great nation, that has got to be one of the requirements of our training system.

So, to the extent that it makes sense and is worked out carefully, I think the national labs and the SSC, in particular, should be tasked to play a big role.

Mr. Pursell. Do you see a major component built into this network? I have asked a lot of questions of a lot of people in the consortium, but I really haven't gotten any specifics—

Dr. Drell. I have not looked into it.

Mr. Pursell. Maybe Doctor Decker might know.

Dr. Decker. Let me just say that certainly it has been our intent to try to use all the national laboratories extensively to improve science education in the country. That is a task that Secretary Watkins has given all the laboratories and, in particular, the SSC laboratory.

I know that the SSC laboratory has already begun to develop educational programs. Right now I don't think I can give you the details of what their plans are, but I would be happy to furnish those to you for the record.

[The information follows:]

SSC LABORATORY PLANS TO DEVELOP EDUCATIONAL OPPORTUNITIES

One goal of the SSC Laboratory is to create a major educational resource for the nation. The Laboratory will develop programs aimed at students from kindergarten through post-graduate research. Currently, staff at the Laboratory are evaluating programs at other national laboratories, the National Science Foundation and other organizations which might serve as a guide in developing their own programs.

Current efforts include:

- A fellowship program, to begin in the fall of 1990, for post-graduates and junior faculty members that will encourage young scientists to pursue SSC-related studies. Twenty-four fellowships will be awarded.
- The SSC hosted its first high school teacher workshop January 1990 to obtain the views and opinions of teachers and school administrators about ways in which the SSC Laboratory could enhance science education. The meeting generated a long list of ideas that are being assessed. Among the principal items described by the participants was the need for instructions/curriculum materials offering hands-on opportunities for students in basic accelerator or particle physics.

Planned activities include:

- The SSC will seek to institute a summer intern program that would involve both undergraduate and high school students in summer research projects at the SSC.
- The SSC is currently studying two exhibit ideas. One exhibit topic is devoted to the SSC and related physics. The second exhibit would combine high energy physics and cosmology and their use in learning about the origins of the universe.
- The SSC has committed funding for SSC staff members to participate in the National Urban League's Black Executive Exchange (BEEP) Program. SSC staff will travel to historically black colleges and universities across the U.S., to give presentations about the SSC and related subjects. In addition to giving faculty members and students an overview of the SSC projects, these presentations will serve as a motivational tool towards encouraging minority students to pursue scientific disciplines.
- The Boy Scouts of America have requested that the SSC become an official science post for the explorer scouts. In addition, this organization would like the SSC to host a "high tech seminar" day for scouts. This all-day seminar would expose scouts to all phases of the SSC project from construction to on-line experimentation, as well as hands-on demonstrations of SSC related technology.

- National education organizations have encouraged the SSC to develop educational programs which take advantage of the project's different construction phases. An earth science project that focuses upon the geological aspect of the SSC is being studied.
- Educational statistics have indicated that interest in science should begin with elementary school aged children. Therefore, a number of ideas are being pursued at this level. These include, hands-on educational exhibits, scientific theme parks on the SSC campus, art contests, coloring books, comic books, etc.

Mr. **Pursell.** I have been asking that through appropriate people in the consortium. But if that is not a solid, comprehensive program you will lose my support on the project. I know it is an intangible to some extent. It is a long-term goal. But we are short-term crisis oriented people up here. We don't think in long-term sense. That is an absolute disaster. Our studies and statistics—which I have on my desk in my office—that have been prepared scientifically are absolutely staggering and frightening to me. I am very concerned about our future in terms of being competitive.

Secondly, with our so-called peace dividend and our shifting budget, are there applications for this in the strategic defense area? Are we to use the defense dollars to help build this? We can't build it with a budget within the civilian discretionary programs. This is discretionary money. Of that, $300 billion is tied up in the military budget and we can't build two bombers and we can't build a MX and a midgetman.

Some of that money could be applied, I think, to a project here that is a model for the world. But are there military applications to this in the long term, aside from the civil application aspect of it?

TECHNOLOGY TRANSFER

Dr. **Drell.** I can't—I am not prepared to cite a specific transfer of technology. In general, particularly as defense budgets are squeezed, the importance of achieving in our defense systems reliable operation, quality, high technology, to use technology to replace costly manpower, economic technology, fast computers, and the like—the technical challenge to defense, in other words, is increasing as I see it. As the defense dollar gets tighter we can't tolerate waste.

I think that the technical challenge of this machine to our industry, as I said before, can't help but make them better equipped for the machining tolerances, for the latest developments, in control of machinery by computers, temperature controls. These are at the cutting edge. I think it has got to help the quality of our industry. But it is a good question, and I think it is a general fact that this has always been the case and we are going to be relying more on our technical leadership for our national security. This is going to be helping fill the gap in the vacuum as defense dollars pull out of industry. It is also going to be a new kind of challenge in the same kinds of quality intolerances that will be stressed in advanced defense systems.

Mr. **Pursell.** Congressman Myers raised the question about applied sciences that could come out of this.

Dr. **Drell.** Yes.

Mr. **Pursell.** I think we have got to look at some possible visionary applications here; otherwise, we are not going to sell this on the House floor.

Dr. **Drell.** No.

Mr. **Pursell.** I have talked to senior members on both sides of the aisle who say, "What are we going to get out of this?" They don't see the value of the basic research because that is intangible and some members don't understand that. But they do understand what might come out of it in the long term. We need some military and civil application examples that we could use if that is possible. I think it is. We have got some out of space that moved into civil and the military research. All the money we spend on research is mostly for the military and I think that is going to change.

I think bilaterally this President can make a major reduction in the defense budget with Gorbachev, and when that begins to happen I just hope the super collider is on line ready to go so that we can use it as an example of a historic peace dividend for this country and for the world.

I hope we can get our act together here and move along on this project. Thank you very much.

BASIC SCIENCES

Mr. **Bevill**. Well, as you can see, the big question that everybody has is what we are going to get out of it. Of course, the members of this panel are particularly anxious to have the best possible method of describing it. We know what you are saying, and the three of you have covered it very thoroughly and done a fine job.

I was looking at your statement. In page one of your joint statement, Doctor Lee and Doctor Drell, you talk about one breakthrough that you have in basic science. It provided the development of generators, electric motors, telegraph, television, radar, and all modern communications. Actually, reading that made me think of our colleague and my former fellow Alabamian, Claude Pepper. He died at the age of 88 in Congress. He said he remembered everything that we used today coming into being, and every one of those things were things he mentioned.

Of course, all of those are results of basic science, and if we hadn't had basic science we wouldn't have those. Of course, we know Ben Franklin invented electricity, but he didn't come up with a method of delivering it and he didn't have any means of knowing how to make lights burn with it.

I am scrambling like my colleagues on the panel. We are trying to come up with a way of conveying that. We know what you are saying. It is difficult. And then, of course, I might add that the U.S. Department of Energy's track record hasn't been one that we can brag on, I'm sorry to say. Doctor Decker, I am not looking at you now when I say that. [Laughter.]

But it is making tremendous improvements now. I think it is getting on the right track. But we have had $200 million put in Isabelle. You are familiar with Isabelle.

Dr. **Decker**. Oh, yes.

Mr. **Bevill**. And $1.6 billion on Clinch River down in Tennessee. These are at the recommendation of DOE with testimony presented right here before this same table. This is money that we appropriated at the request of the U.S. Department of Energy. Over $3.4 billion for the gas centrifuge program in Ohio. We went up and looked at that. Millions and millions. There were $240 million for the mirror Fusion Facility in California. We could go on and on. All of them are closed.

I mentioned the other day that Clinch River is the only one I know of that we have anything left to show for those billions of dollars. There is a hole in the ground down there in Tennessee. That's all there is. We don't have anything else

On the other hand, each of us are very much aware that basic science research is not an exact science. So I am trying to get the best definition here we can—I don't want to go to Alabama and say that we are using that to make a proton-proton, you know. [Laughter.]

PRIORITIES

So I think this money recommended by the U.S. Department of Energy, recommended by a Nobel Prize winner and the nation's top scientists, is important for the basic research of the country, which has produced many of our modern conveniences and raised the standard of living not only in this nation but in the world. Is that kind of getting along the right lines?

Dr. **Drell**. I think it sounds very good.

Mr. **Bevill**. I'm trying to sum this up, actually, because everybody is asking the same question.

You know, 100 years ago I understand the Patent Office was closed. The reason it was closed was because everything that could be invented had been invented. [Laughter.]

That is why we are here, isn't it? Am I on the right track on this? In other words, they re-opened it. They found out everything hadn't been invented.

We have a difficult issue because, as Mr. Myers and the others have pointed out, we are having to determine priorities. The pannel does not question the benefits of the program, but the priorities are really the question. This is something that the Congress and the President are going to have to decide.

Well, are there any other questions? Mr. Myers?

Mr. **Myers**. Just one suggestion.

If you decide to increase the technical aspects of the project you've just got to make cuts within. If you survive this round, you can't raise the ante again. I'm confident of that. That would be the demise of the project.

Dr. **Drell**. I agree with you. I totally agree.

FOREIGN PARTICIPATION

Mr. **Bevill**. Do either of you—I know Doctor Decker has testified—have any opinion as to how much foreign participation should be included in this project? If it benefits our country it is certainly going to benefit the whole world. Do you have any judgment on this? I know that may be out of your area.

Dr. **Drell**. Our experience at SLAC and our experience with colleagues working at CERN is that the idea, the specific detector, the specific experiment attracts a group of scientists from around the world and they—there is a very extensive collaboration in doing physics with these machines, and doing physics means that back at their laboratory special triggers or computer logic or analysis schemes are developed and checked and brought and integrated together. I think the more of this, the better, because the scientific community is an international community. The laws of nature are not national, they are international. There is one nature for all of us.

So I think everything speaks to full scientific collaboration. I think, on the practical side, the benefit to industry and economy of the building is something that comes in a different way. That is where one has to make the judgment of what the proper practical benefit is at the manufacturing stage. That is in our national interest. I think one would make a very careful judgment there. I'm not offering a judgment on that. It is not my expertise.

Mr. BEVILL. But you do feel that it is wise to have other countries participate?

Dr. DRELL. I do. Yes.

Dr. LEE. Yes. I think definitely. This will be a unique facility. It will be, I think, not for this great country but also for the world.

Mr. BEVILL. There is no duplication with CERN?

Dr. LEE. Absolutely not.

Mr. BEVILL. As I recall, about 19 European countries joined hands on the CERN and are financing that together. I know I had lunch one day over there with the man that built it — or is building it.

Dr. LEE. There is none which is remotely like that. LHC is not in that class.

Mr. MYERS. Would you yield on that point?

Mr. BEVILL. Yes.

Mr. MYERS. Could you make an analogy in cow pasture language that would compare CERN with SSC? Is there a comparison that we could use?

Dr. LEE. I was mentioning that in terms of the reach. It is like a bicycle versus a jeep.

Mr. MYERS. Well, you both get there. A jeep will get there and a bicycle; it is a matter how soon you get there.

Dr. LEE. No. Just use the bicycle if you have a narrow alley, but if you really have tough terrain to explore, the bicycle won't make the trip.

Mr. CHAPMAN. How about a Piper Cub and the SST? That's a pretty good analogy I think.

Mr. MYERS. What?

Mr. CHAPMAN. The Piper Cub versus the supersonic transport.

Dr. DRELL. I think there is an element of time. I understand your concern. You say "Give me a Piper Cub and give me all the time in the world and I will get there." The fact is—

Mr. MYERS. You won't be as comfortable, but you would still get to the same point.

Dr. DRELL. The 17-mile tunnel at CERN can only get you one-third the way we want to go. We have given our best scientific arguments.

Mr. MYERS. Fine. If I want to get to London I wouldn't take a Piper Cub, I would have to take the SST. Is that the comparison? It is where you are going?

Dr. DRELL. That is right.

Mr. MYERS. That is a good analogy. That is an analogy we can explain.

Dr. DRELL. To get that far.

Mr. **Chapman**. Or if you want to exceed the speed of sound, you would not build a Piper Cub to do it.

Mr. **Myers**. As Mr. Conte said, we are in no hurry to get there. We just can't afford to get there in a hurry. All we want to do is get there. So I think the analogy is that we would never get there with CERN. If we join the CERN group, as the New York Times suggested yesterday, we won't get where we want to go. There is no way of getting there on a CERN. That is an analogy I asked for. Thank you.

Mr. **Fazio**. Mr. Chairman?

Mr. **Bevill**. Yes, sir?

FOREIGN PARTICIPATION

Mr. **Fazio**. I would just like to follow up on your question about foreign participation and ask Doctor Decker a question.

I think that we are clearly in agreement with the scientific point of view that we want to have a good deal of international interchange on the science. The industrial base benefits of building the project is another question altogether. We have assumed that there will be a certain amount of foreign participation in addition to the money from the State of Texas, which is a integral part of making our budget even at $5.9 billion. I assume that part will grow if we go to $8 billion.

Where do we stand in terms of foreign involvement? What share of the total? What dollar figure? I understand we have one agreement with India—and none other at the moment. But perhaps you could give us an update as to where we are.

Dr. **Decker**. Yes. I'll be glad to do that. First of all, we have put together an international plan which is a classified document, but we are certainly able to share with you some of the contents of that plan and our thoughts.

We will be prepared to move forward aggressively in talking with other nations beginning in June. Deputy Secretary Moore is planning to lead delegations to a number of countries starting in June.

Our goal has been stated as trying to achieve a third non-Federal participation. Let me state that as a goal. Obviously, with the price going up that becomes more and more difficult to meet—especially when you have to deal with the problem that most likely the contributions to this project from other countries will be in-kind contributions and we do want to make sure that a reasonable portion of the high-technology components are, in fact, manufactured by U.S. industry. Otherwise, we are going to lose that particular benefit to industry which we have talked about extensively this morning. So it is a real balancing act that we have to do there.

Mr. **Myers**. How do you do that? That has been a concern. We are talking about being a world leader again, and yet we are sharing this technology with the rest of the world. It is kind of self-defeating, isn't it? We open up to the rest of the world to all of our technology.

Mr. **Fazio**. We are in a Hobson's choice, John, because we are choosing between getting some additional funding to make this thing pencil out. At the same time, if we take too much of it we give away the enhancement to our own national industrial base, which was one of the major, driving forces behind agreeing to the project.

Mr. **Myers**. One of the reasons we can't join the CERN group is the fact that we want to recapture world leadership. At the same time, we are bringing in our competitors to be a part of this consortium. Then we are not really capturing the world leadership except that we are doing it on our shores. But is that, in itself, worth the cost of this huge machine?

Dr. **Decker**. Well, let's distinguish between the two parts of that. One is doing the science on the machine, which is open to scientists from around the world. That has been the tradition in the high energy physics corner. I think it is good that there is not preferential treatment given to choice of scientific proposals on the basis of whether or not somebody contributed to the machine. That has been a principle that has been used at CERN and European accelerators, as well as our own.

The other——

Mr. **Myers**. Except that we didn't get the technology on the enrichment process that the Italians developed and the Dutch developed or even the British developed. When they went to the gas centrifuge they didn't share that with us, did they?

Dr. **Decker**. No. That's——

Dr. **Myers**. You weren't on board then, I don't believe.

Mr. **Decker**. No. That is a different area. Technology that is close to commercialization generally is not shared, as it is in something like high energy physics. Really basic sciences where there is no immediate commercialization potential, those are areas in which one can cooperate quite easily with other countries and not cause problems.

But the other area is in the manufacture of the components. There we certainly would like to see a good fraction, as I mentioned earlier, of those high-tech components manufactured here in the United States by U.S. companies.

If you take an area like the superconducting magnets, which is talked about quite frequently as an area where one might expect to get some contributions, there are companies in Europe and in Japan that, in fact, have more experience in manufacturing those magnets than our own domestic companies. So, in fact, I think we will be learning something from foreign companies in this case.

Mr. **Fazio**. Are we going out for bid here, Jim? Is that how this issue is going to be resolved? Or are you going to make up-front decisions as to what country or what company within the country will make what? How are we going to make the decision work out on the percentage of the total? Or are we just going to let the marketplace and industrial technology dictate?

Dr. **Decker**. Well, that is something we are going to have to work at very carefully as we thread our way through these negotiations with other countries. But clearly we have got to do it in a way that protects U.S. industry.

Mr. **Fazio**. Let alone undermine the political base of the project.

Dr. **Decker**. Yes, sir.

Mr. **Fazio**. Yes, sir. Thank you.

Mr. **Bevill**. All right. Any other questions?

[No response.]

Mr. **Bevill**. Well, I thank each of you for your fine presentation. This committee will now stand adjourned until Tuesday at 10:00.

[The questions and answers for the hearing record follows:]

SUPERCONDUCTING SUPER COLLIDER

Mr. Bevill. How do you describe the value of probing the frontiers of science to the average citizen?

Dr. Decker. Our modern society is based on science and technology -- computers, television, medicine, etc. The advances that have been made this century in our standard of living are astounding and these advances were mostly driven by the better understanding of nature achieved by past probing of the frontiers of science. We expect future advances in the betterment of mankind to come from today's investment in exploring the frontiers of science and technology.

Mr. Myers. Now that the projected cost of the SSC has increased, is the $318 million Administration budget request for fiscal year 1991 enough to ensure the project will proceed on schedule?

Dr. Decker. As you know, we are developing a new site specific cost and schedule baseline, but we believe that the Administration's request of $318 million is sound and will be consistent with the new schedule.

Mr. Myers. Admiral Watkins testified before the subcommittee on March 5 that it may be five months (sometime this summer) before a more solid DOE estimate of the SSC's total construction cost would become available. Two weeks ago, the Department announced the likely need to increase the SSC budget by nearly $2 billion. Can the subcommittee expect another projected increase sometime later this year?

Dr. Decker. The SSC Laboratory is in the midst of developing a revised cost estimate for the SSC. The Department plans to conduct two thorough independent reviews of this estimate and announce a validated technical, cost and schedule baseline of the SSC in August 1990. We do not know at this time what the final cost figure will be. I can assure you that we are concerned about costs and will do our best to keep the costs as low as possible.

STATE OF TEXAS

Mr. Myers. The State of Texas has expressed its readiness to contribute to the project. A pledge of $1 billion towards the machine was made by the state last year. Now that the cost has escalated by $2 billion, is the State of Texas' share also going to increase?

Dr. Decker. No, we do not expect the Texas contribution to the SSC to increase.

Mr. Myers. What sort of agreements between the State of Texas and the Department of Energy have been executed?

Dr. Decker. The Department and the State of Texas have not yet reached a detailed agreement on the use of the Texas contribution. We will be happy to provide a copy of this agreement to the Congress when it is executed.

Mr. Myers. What other states will be involved in the building and researching of the SSC and its results?

Dr. Decker. There are no commitments at this time for direct contributions from any other state governments. University scientists from across the U.S. will participate in SSC largely through the experimental program and detector fabrication. Since research experiments at high energy physics laboratories are selected through a competitive process it is not possible at this time to identify exactly who the participants will be. There are currently about 100 universities involved in high energy physics research. We would expect that during the lifetime of the SSC most or all of these universities would be involved in the SSC program. Further, industries from many states already have contracts with the SSC Laboratory and we expect many more as construction gets fully underway, with about 80 percent of the dollars subcontracted out.

FOREIGN PARTICIPATION

Mr. Myers. Update the subcommittee on the efforts of the Department of Energy to procure foreign participation in the cost of the SSC. DOE has previously indicated it expects a third of the project to come from non-Federal sources. Does this only refer to foreign participation or is the State of Texas' share included in this amount?

Dr. Decker. The Administration goal has been for one-third of the requested total project costs to come from non-Federal sources. This amount in the past has been estimated at about $2 billion. The State of Texas will contribute up to $1 billion for the construction of on-site facilities and other SSC systems. The Department is seeking the remainder from collaborative arrangements with other nations.

Mr. Myers. What sort of plan is in progress to achieve this goal with regard to foreign nations?

Dr. Decker. An International Plan was prepared in anticipation of negotiations with other countries. The Plan sets out the framework in which DOE will conduct negotiations, and provides a strategy for approaching various countries. Visits to other countries to begin the negotiation process are expected to begin this summer.

DESIGN CHANGES

Mr. Myers. Please explain the design changes of the SSC that have occurred within the past year.

Dr. Decker. The major changes incorporated into the recently developed site-specific design of the Super Collider are: increased injection energy from 1 TeV to 2 TeV, increased collider dipole magnet aperture from 4 cm to 5 cm diameter and a slightly larger circumference from 53 miles to 54 miles. This design, which builds on the 1986 conceptual design and takes into account all new technical information available, will enable the Super Collider to meet the energy and luminosity goals set for it with less risk and permit a shorter commissioning period.

Mr. Myers. How has this affected the projected cost of the project?

Dr. Decker. The SSC cost estimate is still undergoing vigorous study, but, roughly, the cost increase due to these design changes alone is about $1.2 billion, which together with other updated estimates would result in a total increase of about $2 billion.

Mr. Myers. Are further changes likely?

Dr. Decker. We expect further refinement of the design as it is finalized. Additional major changes resulting in large cost increases are not expected, however, and there is a contingency allowance to cover the anticipated small changes that are normal to large projects of this type.

INTERNATIONAL INDUSTRIAL SYMPOSIUM

Mr. Myers. What are the expected results of the International Industrial Symposium on the Super Collider that is convening at Miami Beach this week?

Dr. Decker. At the symposium, the Deputy Secretary of Energy announced the release of the SSC footprint to the State of Texas for land acquisition and his intention to begin negotiations overseas as early as June.

Mr. Myers. Will the issue of international participation be addressed at the symposium.

Dr. Decker. International participation was not specifically addressed in any of the technical sessions although it was touched upon in the panel discussion by Congressmen Hayes, Fazio, Pursell and Myers. About 80 foreign nationals attended the symposium and foreign firms were well represented in the exhibit areas.

Mr. Myers. Is the Department satisfied that enough research on the basic components of the machine has been conducted to ensure the SSC will function properly?

Dr. Decker. Yes, we are confident that the basic design of the SSC is sound. Most of the technical systems required for the SSC have already been successfully used in existing operating accelerators and the extension to the SSC should be straightforward. Research related to the SSC design is continuing in many areas -- magnets, injector systems, etc. As with other large projects of this type, this ongoing R&D will be used to provide the information required for the more detailed designs.

SSC ADVISORY COMMITTEE

Mr. Myers. What is the status of the SSC Advisory Committee within the Department? What do you envision the most effective role of the Committee to be?

Dr. Decker. The Department does not now anticipate establishing a separate SSC Advisory Committee. The existing High Energy Physics Advisory Panel (HEPAP) will continue to provide independent guidance on technical aspects of the SSC program, from preconstruction R&D through independent scientific research.

AMERICAN UNIVERSITY AND INDUSTRY SCIENTISTS

Mr. Myers. What is the role of American university and industry scientists in the development of plans for the SSC?

Dr. Decker. Universities Research Association (URA) is the management and operations contractor for the SSC. It is presently composed of 77 North American universities, and is deeply involved in SSC planning. University and industrial scientists sit on the various boards and committees which guide the SSC Laboratory. American university scientists are playing a leading role in the development of detector concepts for observation of the high energy SSC collisions. Many industry scientists and engineers are also involved in the planning for ~~these de~~tectors. The SSC Laboratory also discusses with industry the technical systems needed for the project.

OUTREACH PROGRAMS

Mr. Myers. What efforts does the Department have underway to provide information to the general public on the purpose of the SSC? Are there any kind of DOE "outreach" programs planned? In other words, how is the Administration going to get the support of the American people nationwide behind this project?

Dr. Decker. The Department has assembled a package of informative brochures on the SSC which are distributed to the public upon request. Approximately 5,000 of the informational packages have been sent to date. A booklet on technology spin-offs anticipated from the SSC is being developed. In addition, the DOE staff participate in technical and business-related seminars upon invitation.

To maintain communications with the scientific community and to assist in recruiting, the SSC Laboratory publishes "The SSCintillator," the second edition of which is being planned for this spring. For public information, the Laboratory distributes the URA publication, "To the Heart of the Matter," which describes the high energy physics goals of the SSC device in terms readily understandable by the layman.

SSC FY 1991 BUDGET REQUEST

Mr. Myers. Now that the projected cost of the SSC has increased, is the $318 million Administration budget request for fiscal year 1991 enough to ensure the project will proceed on schedule?

Dr. Decker. Yes, the $318 million requested by the Department for FY 1991 is adequate to ensure that the most critical SSC activities proceed in a timely fashion.

Mr. Myers. Describe how the SSC will improve our nation's technological and economic competitiveness.

Dr. Decker. In the near term the SSC will build up America's high-tech muscle through the demand for state-of-the-art (and beyond) components in many areas -- superconducting magnets, high speed electronics and data acquisition, computer controls, specialized particle detectors, etc. The longer term is more difficult to predict with certainty, but past high energy physics projects have an excellent history of spin-offs and we expect this will continue with the SSC.

BENEFITS AND RESULTS DERIVED FROM THE SSC

Mr. Myers. Will the benefits and results derived from the SSC be helpful in furthering our knowledge of the causes of diseases that are still plaguing mankind after thousands of years? Will the research conducted on the project help us find a cure for some of these diseases, such as cancer?

Dr. Decker. That is very hard to predict. The main thrust of high energy physics does not address medicine and the cure of diseases. Nonetheless, many of the techniques developed for high energy physics research have proven invaluable for a wide range of applications in medicine -- CAT scans, PET scans, Magnetic Resonance Imaging, radioisotopes, cancer therapy with particle beams, better materials for artificial hip joints using heavy ion implantation, etc. While we expect the SSC to continue this long tradition of fruitful spin-offs to the medical field, we can not now say precisely what these will be.

Mr. Conte. Earlier this year, the Industrial Research Institute published the results of a survey of its member companies. Respondents were asked to rank five "megascience" projects according to their own priorities. These projects included the human genome project, the space plane and the space station. The SSC came in dead last, behind the Strategic Defense Initiative. Obviously, industrial researchers don't share your unbridled enthusiasm for the project. Where did they go wrong?

Dr. Decker. The SSC is a basic science project aimed at developing new scientific knowledge. The most important applications of such fundamental research are usually long-term in nature and revolutionary in character, with applications that are not foreseen in advance. Basic research of the type to be conducted at the SSC has in the past also resulted in important spin-offs in the shorter term, but it is again difficult to predict exactly what or when. Although I have not pursued this issue in depth, I suspect that the companies surveyed were more concerned about short-term payoffs and benefits. These characteristics are of course what makes this type of research generally appropriate to support by the Federal Government, rather than industry.

FERMILAB RESEARCH PROGRAMS

Mr. Conte. Let's take a moment to discuss practical applications of the SSC. My understanding is that the SSC is a "pure science" project which is not conceived as a means of producing industrial benefits, although industrial spin-offs are likely. Is that correct? Could you please identify the major industrial spin-offs of the accelerator at Fermilab, the SSC's baby cousin? Do you have any idea of what applications might result from subatomic discoveries of the SSC?

Dr. Decker. The industrial-scale superconducting technology base developed for the Tevatron construction effort was a principal cornerstone of what is now a billion-dollar-per-year magnetic resonance imaging industry. The Tevatron still remains the largest superconductivity project ever completed, and has been the highest energy particle accelerator in the world since 1985. Four Fermilab physicists were awarded the National Medal of Technology by President Bush in October 1989, for their key roles in the success of the Tevatron project. Other recent major technological by-products of Fermilab's research programs include the successful design and construction of a proton accelerator for cancer therapy, which was just commissioned by an industrial partner at the Loma Linda University Medical Center in California, and the development and transfer to industry of a unique new microprocessor computing architecture now widely in use. Fermilab has also received a dozen IR-100 Awards for a variety of novel industrial projects. The Laboratory has an active Industrial Affiliates program which currently has 35 industrial members, including a dozen Fortune 500 companies as well as a variety of young and aggressive high technology development firms. As with any forefront basic research it is not possible to identify in advance specifically what applications might result from the discoveries at SSC. We can only point at history which is rich in examples of how practical benefits that affect the lives of all Americans flow from breakthroughs in basic research. Fermilab is a good example of this point.

MAGNET DESIGN

Mr. Conte. Last month, Dr. Bromley indicated that work on the SSC should be delayed until industry proves it can manufacture the specialized magnets required by the massive atom smasher. He said, "It is prudent not to move forward until such time that we have demonstrated that we can make the magnets industrially." He noted that it has not been proved that the industry is capable of making magnets in such large numbers as are required by the SSC. Do you care to respond to these comments?

Dr. Decker. We share Dr. Bromley's concern that the SSC project not get out in front of the magnet industrialization. Indeed, in the President's FY 1991 budget request it is stated that, "No tunneling construction is expected to occur until a decision has been made to go to commercial production of the superconducting magnets." Important design activities on the other technical components and some construction related to magnet completion will continue in parallel with the magnet industrialization. The latter would include magnet development and test facilities needed in support and evaluation of the magnet industrialization program. While the magnet industrialization process will proceed over some period of time, recent experience in the industrialization of superconducting magnets for the HERA collider in Germany bodes well for the SSC.

Mr. Conte. On page five of your written testimony, you note that the SSC Laboratory management has now developed a detailed design, specific to the Ellis County site. You go on to note that, "This has led to an increase in the estimated total project cost from the 1986 proposal." Are you suggesting that some of the cost increases have arisen as a consequence of the site selection? For example, are the labor and materials cost higher in Ellis County than DOE had projected in 1986?

Dr. Decker. The design changes and cost increases are generally not related to the Texas site. The major design changes are in the technical systems and are based on new technical information not available in 1986. Most of the cost increase is related to these design changes, with the remainder due primarily to a reestimate of magnet production man hours and rates which are unrelated to the Texas site.

FIRE ANTS

Mr. Conte. What happened to the pesky fire ants that threatened to stand this project on its head about a year ago? Did they pack their bags and move to a less hostile climate?

Dr. Decker. The fire ants have not packed their bags; they are still in Texas. These ants seem to be attracted to electrical cables in contact with the ground, and then they eat the insulation. Most of the SSC cables will be safe inside the tunnel, and the small amount of cable in contact with the ground can be protected.

Mr. Conte. Utility companies in the Southwest have indicated that the fire ants are a "nuisance". Do the ants promise to be a nuisance during construction or operation of the SSC?

Dr. Decker. If there is a problem during operation it will be only a minor nuisance and of less significance than that experienced by the utilities who must maintain much greater lengths of cables. The impacts of fire ants will be addressed in the Supplemental Environmental Impact Statement.

CERN ACCELERATOR

Mr. Conte. Will the CERN accelerator in Europe become obsolete upon development of the SSC?

Dr. Decker. With regard to the Large Hadron Collider, we are not in a position to make definite pronouncements on what decision CERN might make regarding the future of this lower energy facility. There is a long history of earlier, lower energy accelerators remaining highly productive for many years after they no longer operate at the energy frontier.

Mr. Conte. Many advocates of the SSC claim that it is critical for the United States to develop the machine and to make the discoveries for which the SSC is designed. The knowledge that is expected to result from the SSC won't be classified or militarily sensitive, will it? Will the new knowledge be freely shared with the international physics community?

Dr. Decker. The knowledge to be gained from the SSC is unclassified and will be freely available to the international physics community.

Mr. Conte. If so, doesn't it make sense to emphasize international cooperation, collaboration and financial participation over nationalistic competition?

Dr. Decker. We are indeed pursuing strong international cooperation and contributions to the SSC. The Department has completed its International Plan for the SSC, has begun to discuss this plan with the Congress, and plans to begin visiting potential foreign partners this summer.

NON-FEDERAL FUNDING

Mr. Conte. The Governor of Texas recently stated that the Department of Energy is currently not in a position to seek foreign funds to build the Super Collider and that no one overseas is in a position to make such a commitment. Do you agree?

Dr. Decker. We believe that as a result of recent events we are now in a position to seek foreign funds; indeed, the Deputy Secretary of Energy announced that he will lead a delegation to several countries to begin negotiations as early as June 1990. These events include: a review and endorsement by a blue-ribbon panel of world-renown physicists for the 20 TeV energy level for the SSC; design changes in the SSC that will lead to speedy commissioning and reliable operation; release of the footprint to the State of Texas for land acquisition; and Administration support and commitment to proceed with the SSC, even with increases in the cost.

Mr. Conte. If we are unable to secure substantial foreign commitments for the SSC, should the U.S. proceed full speed ahead on its own? Why or why not?

Dr. Decker. The SSC is a critical part of the Administration's initiative to strengthen America's position as a world leader in science and technology. It is a symbol of the Nation's commitment to scientific leadership in this century and the next, and the concrete manifestation of that leadership. While it is difficult to conceive that other nations would not want to play a significant role in the SSC program, we believe that with or without foreign help, the U.S. should proceed with the project.

DEPARTMENT OF ENERGY

LIST OF WITNESSES BEFORE THE SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

FISCAL YEAR 1991 BUDGET REQUEST

SUPERCONDUCTING SUPER COLLIDER

MARCH 22, 1990

PRINCIPAL WITNESSES

Dr. James F. Decker
Acting Director, Office of Energy Research
U.S. Department of Energy

Dr. Sidney D. Drell
Professor and Deputy Director,
Stanford Linear Accelerator Center,
Stanford University

Dr. Tsung-Dao Lee
Enrico Fermi Professor of Physics,
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SIDNEY D. DRELL is Professor and Deputy Director, Stanford Linear Accelerator Center, Stanford University. In 1984 he was awarded a prize fellowship of the John D. and Catherine T. MacArthur Foundation.

Dr. Drell is a physicist and arms control specialist. Since 1960 he has been active as an advisor to the Executive and Legislative branches of government on national security and defense technical issues. His activities have included membership on the President's Science Advisory Committee and consulting for the National Security Council, the U. S. Arms Control and Disarmament Agency, and the Congressional Office of Technology Assessment. His 1983 Danz Lectures at the University of Washington were published under the title, *Facing the Threat of Nuclear Weapons.*

Dr. Drell has received many honors and awards for his research achievements in theoretical physics (elementary particle processes). These include the Ernest Orlando Lawrence Memorial Award of the Atomic Energy Commission, two Guggenheim Fellowships, and election to the National Academy of Sciences and the American Academy of Arts and Sciences. Dr. Drell is a director of the Arms Control Association in Washington, D. C., and received the 1980 Leo Szilard Award for Physics in the Public Interest from the American Physical Society. He was President of the American Physical Society in 1986.

October 1989

August 1989

Sidney D. Drell

PROFESSIONAL BIOGRAPHY

Present Position

- Professor and and Deputy Director, Stanford Linear Accelerator Center, Stanford University

Present Activities

- Adjunct Professor, Department of Engineering and Public Policy, Carnegie Mellon University
- Consultant, Office of Technology Assessment, U. S. Congress
- Member, Board of Directors, The Arms Control Association, Washington, D. C.
- Member, JASON Division, The MITRE Corporation (former member of JASON Steering Committee)
- Member, Board of Governors, Weizmann Institute of Science, Rehovot, Israel
- Member, Advisory Committee, MIT Physics Department
- Member, Board of Directors, "Annual Reviews, Inc."
- Member, American Committee on U.S.-Soviet Relations (formerly Committee on East-West Accord) [Member, Science Advisory Committee]
- Member, Council on Foreign Relations, New York
- Member, Advisory Board, Institute for National Strategy, Los Angeles, California
- Member, Advisory Committee, Harvard University Center for Science and International Affairs
- Member, National Advisory Board, Univ. of Illinois Office of Arms Control, Disarmament and International Security
- Member, MIT Lincoln Laboratory Advisory Board
- Member, Aspen Strategy Group
- Advisor, Ploughshares Fund, San Francisco
- Member, Carnegie Commission on Science, Technology, and Government
- Member, Scientific and Academic Advisory Committee on the National Laboratories, University of California

Professional and Honorary Societies

- American Physical Society (Fellow) - President, 1986
- National Academy of Sciences
- American Academy of Arts and Sciences
- American Philosophical Society
- Phi Beta Kappa
- Sigma Xi
- Phi Kappa Phi

Awards and Honors

- Fellow of the John D. and Catherine T. MacArthur Foundation, November 1984-1989
- Ernest Orlando Lawrence Memorial Award - 1972 - for research in Theoretical Physics (Atomic Energy Commission)
- University of Illinois Alumni Award for Distinguished Service in Engineering - 1973; Alumni Achievement Award - 1988
- Guggenheim Fellowship - 1961-62 and 1971-72
- Richtmyer Memorial Lecturer to the American Association of Physics Teachers, San Francisco, California - 1978
- Leo Szilard Award for Physics in the Public Interest - 1980 - presented by the American Physical Society
- D.Sc. (Honorary), University of Illinois, Chicago Circle - 1981
- 1983 Honoree of the Natural Resources Defense Council for work in arms control
- Lewis M. Terman Professor and Fellow, Stanford University - 1979-84

TSUNG-DAO LEE

Born: November 25, 1926

Citizenship: U.S.

Education: Ph.D., The University of Chicago, 1950

1950	Research Associate in Astronomy, University of Chicago
1950-51	Research Associate and Lecturer, University of California, Berkeley
1951-53	Member, Institute for Advanced Study, Princeton
1953-55	Assistant Professor, Columbia University
1955-56	Associate Professor, Columbia University
1956-60	Professor, Columbia University
1960-62	Adjunct Professor, Columbia University
1960-63	Professor, Institute for Advanced Study, Princeton
1962-63	Visiting Professor, Columbia University
1963-64	Professor, Columbia University
1964-	Enrico Fermi Professor of Physics, Columbia University
1984-	University Professor, Columbia University

1957	Loeb Lecturer, Harvard University
1957	Nobel Prize in Physics (with C. N. Yang)
1957	Albert Einstein Award in Science
1957	Member, Academia Sinica
1958	D.Sc., Princeton University
1959	Member, American Academy of Arts and Sciences
1964	Loeb Lecturer, Harvard University
1964	Member, National Academy of Sciences
1966	Guggenheim Fellow
1969	LL.D., The Chinese University of Hong Kong
1972	Member, American Philosophical Society
1978	Sc.D., The City College of the CUNY
1981	Honorary Professor, University of Science and Technology of China
1982	Member, Accademia Nazionale dei Lincei, Rome
1982	Honorary Professor, Jinan University, China
1982	Honorary Professor, Fudan University, China
1982	Diploma di Perfezionamento in Physics, Scuola Normale Superiore, Pisa
1984	Honorary Professor, Qinghua University, China
1984	Sc.D., Bard College
1985	Sc.D., Peking University
1985	Honorary Professor, Peking University
1985	Honorary Professor, Nanjing University
1986	Litt.D., Drexel University
1986	Honorary Professor, Nankai University
1986	Order of Merit, Grande Ufficiale, of the Republic of Italy
1987	Honorary Professor, Shanghai Jiao Tong University
1987	Honorary Professor, Suzhou University
1988	Honorary Professor, Zhejiang University
1988	Doctor of Science, University of Bologna

TESTIMONY ON THE
SUPERCONDUCTING SUPERCOLLIDER (SSC)

before the

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

of the

HOUSE APPROPRIATIONS COMMITTEE

March 22, 1990

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S. D. Drell

Stanford Linear Accelerator Center

and

T. D. Lee

Columbia University

The quest to find out what we and our physical world are made of is a mark of civilization that dates back to its very beginning. But it wasn't until approximately 500 years ago--about the time of the discovery of North America--that modern science was born. This came about through the realization that theories must be tested by experiment, and that certain crucial and precise observations can in turn lead to new ideas. Through this strong coupling between experiment and theory, we are able to reduce the great diversity of natural phenomena to a single set of fundamental physical laws. Therefore, any progress that can be made on the fundamental laws will have its effect everywhere and in everything.

The important observations on electricity by Ben Franklin in the 18th century and the crucial experiments on the electric and magnetic forces by Faraday in the 19th led to the unification of these two forces by Maxwell later in that century. This, in turn, made it possible for us to understand the fundamental nature of light and its identity as a pure electromagnetic phenomenon. From this breakthrough came the development of generators, electric motors, telegraph, television, radar and, indeed, all modern communications.

At the turn of our century two crucial, though seemingly esoteric, discoveries were made. One was the experiment by Michelson and Morley in 1887 in this country; the other was the black-body radiation formula by Max Planck in 1900. The former was the basis for Einstein's theory of relativity and the latter laid the foundation for us to construct quantum mechanics. In this century, all the modern scientific and technological developments--nuclear energy, atomic physics, molecular beams, lasers, x-ray technology, semiconductors, superconductors, supercomputers--only exist because we have relativity and quantum mechanics. To humanity and to our understanding of nature, these are all encompassing.

Now, near the end of the twentieth century, we must ask what will be the legacy we give to the next generation in the next century? The physicists at the end of the 1890's had a glimpse of a new vista, the existence of exciting and unexplored fundamental areas. Today we also know of the existence of an entirely new class of fundamental forces: the one that is responsible for symmetry breaking. Of this new force, we know only of its existence, and very little else. The new Superconducting Super-collider (SSC) is the key we will use to unlock the door and to take the next big step. As was the case when other great advances were achieved in understanding nature, present progress on the basic physical laws will have a similar long-range and vast impact on the technology of the future.

Since the SSC project is of so large a magnitude and so great an expense, it naturally invites a number of serious questions, such as:

1) How important is the SSC in terms of the new knowledge it will provide?

2) Are there alternative possibilities, perhaps more modest in size and cost, for advancing the frontiers of our knowledge?

3) How important is it to the United States to invest in science, and in high energy physics in particular? What practical benefits to society can be expected to result from the SSC?

1) How important is the SSC in terms of the new knowledge it will provide?

The very spirit of physics is to explore the unknown. While this makes it difficult for us to predict precisely what we will discover in the future, we *are* in a position to forecast the minimum payoff. Based on our present knowledge, we are confident that the SSC will explore a specific region in which major new discoveries will be made. The SSC specifications were established with this goal in mind, and experience gained since 1983 has strengthened our conviction of the importance of constructing a proton-proton collider with the beam energy of 20 TeV and luminosity of 10^{33} cm^{-2} sec^{-1}, as originally proposed.

As a result of truly remarkable progress during the past twenty years, we do have one clear benchmark that is crucial as a guide in setting the energy of SSC at 20 TeV. This benchmark comes from our success in unifying the electromagnetic forces with the weak forces of radioactive decay into a single entity, the electroweak interaction (commonly referred to as the standard model); it is an achievement reminiscent of the unification of electricity and magnetism by Maxwell, referred to earlier.

Based on our new theoretical structure for unifying weak and electromagnetic forces, the existence and masses of new particles, the W and Z intermediate bosons, were predicted and confirmed experimentally at CERN in Europe in 1983. From the predictions of this theory, we are certain that exciting new phenomena must appear at the SSC design energy.

At present, we know that there exist three classes of forces, the strong force that binds the nucleus together, the electroweak force, and gravity. We know that all these forces are based on symmetry principles, yet practically all these symmetries are broken. The symmetry breaking lies outside the present scope of our understanding. A major task of the SSC is to understand this new class of symmetry-breaking forces. Our present electroweak theory makes it possible for us to say with confidence that 20 TeV is about the minimum energy needed to see the new phenomena in whatever form they may take.

The masses of all known particles break these symmetries. Consequently, an understanding of the symmetry-breaking forces will lead to a comprehension of the origin of the masses of all known particles. One of the promising manifestations of symmetry breaking may be the existence of a new type of particles, the Higgs mesons. If so, then in addition we would also discover such new particles. In order to make sure that we can unravel the nature of the symmetry-breaking force in the electroweak interaction, we must measure the scattering between the W and Z bosons, and that we are confident can be done at the 20 TeV design energy of SSC.

The recent major advances in particle physics and astrophysics have given us the first-ever experimentally-based glimpse of the history of how the universe has evolved following the Big Bang of some 15 billion years ago. The very high collision energy of the SSC will recreate the physical state that existed in our universe about 1 femtosecond (10^{-15} sec.) after the Big Bang. Future history books will tell that ours was a time when mankind was able to begin recreating the evolution of the universe following that Big Bang based on solid experimental data, not just on theoretical concepts. The SSC together with our scientifically productive deep space probes will enable us to write further chapters in that history.

The search for the smallest building block that everything is made of drives us to explore physical phenomena within smaller and smaller distances; that necessitates energies higher and higher in inverse proportion to the distance in question. The SSC energy will enable us to examine the physical space within an atto-centimeter (i.e., 10^{-18} cm., a distance hundreds of thousands times smaller than the size of a nucleus). Since there is no comparable facility being planned anywhere else in the world, the very uniqueness of SSC insures that we will be exploring in an entirely uncharted region. Of course, we cannot predict what kind of new basic particles SSC will definitely produce. It is precisely this major step into the unknown that poses the challenge, captures our imaginations and promises the greatest intellectual rewards. This is why SSC will attract the best creative young minds in the world. It will also restore our cutting edge in both basic science and high technology.

Physics is monolithic. There exists only one universe, our universe. The multitude of forms of all matter obeys only one set of fundamental laws and we are at the threshold of comprehending that set of fundamental laws. To nature, the same set of laws governs the motion of all particles in every aspect of their manifestations--gas, liquid, solid, living beings, planets, stars, galaxies, from the beginning of the universe to the present. In physics, there is no distinction between the different disciplines of our profession. Our aim is to understand that set of laws which governs everything. SSC makes a direct route toward achieving this understanding. It will be our contribution to the civilization of the next century.

2) Are there alternative possibilities, perhaps more modest in size and cost, for advancing the frontiers of our knowledge?

This question has been addressed by the community of high energy physicists--the machine builders, the experimentalists and the theorists--since 1982 in a number of workshops and in collaboration with the Department of Energy through the mechanism of its HEPAP, the High Energy Physics Advisory Panel. Encouraged by the dramatic discoveries at the CERN proton-antiproton collider and by the successful operation of the Fermilab Tevatron--the first superconducting synchrotron--the 1983 HEPAP Subpanel on Future Facilities recommended "the immediate initiation of a multi-TeV, high-luminosity proton-proton collider project with the goal of physics at the earliest possible date." That recommendation may be taken as the beginning of the SSC project.

In March 1986, the SSC Central Design Group, composed of physicists and engineers drawn from universities and national laboratories around the world, produced a site-independent conceptual design for a proton-proton collider with 20 TeV per beam and peak luminosity of 10^{33} cm^{-2} sec^{-1}. The two most important ingredients of that recommendation were the conviction of the scientific community that the technology existed to build a reliable and versatile SSC project designed to those specifications and that our scientific understanding provided confidence that the SSC would provide the data necessary for the beginning of an exploration of how symmetries are broken in the basic forces of nature, leading to an understanding of the origin of the masses of all particles.

The SSC Laboratory (SSCL) management has now developed a detailed design, specific to the site selected in Ellis County, Texas by the DOE. This has led to an increase in the estimated total project cost from the 1986 proposal. The cost increase arises primarily from two types of changes. The first type involves recalculation of labor and materials costs and requirements for magnet R&D and instrumentation to assure reliable accelerator performance. The second type involves technical changes (higher injection energy and a larger magnet aperture).

The main reason for the technical change is because large-scale accelerators using superconducting magnets have only been in operation since 1986, after the original conceptual design of the SSC was made. Over the last two years, beam measurements at the Tevatron at Fermilab and magnetic measurements at DESY (the German Electron Synchrotron Laboratory) have shown the existence of persistent eddy currents that require correction. Based on this experience, the injection energy and the magnetic aperture were increased in order to ensure a reliable machine. New massive numerical simulations using supercomputers now provide us with detailed knowledge of stability under realistic operating conditions. SSCL judges these technical changes to be required for reliable operation and efficient commissioning of the new accelerator.

As a result of these changes, and in particular the increased cost, the DOE constituted a "HEPAP Subpanel on SSC Physics" "to provide advice on the range of useful machine parameters in order to complete the design phase of the facility."* It was the unanimous recommendation of this panel, and HEPAP itself in accepting and transmitting it to DOE, that implementing these design changes "will ensure confidence in reliable and timely operation of the SSC." The subpanel found that the only cuts that would allow substantial cost savings would seriously reduce the capabilities as well as he scientific potential of the SSC. It recommended unanimously against redesigning the machine with a reduced circumference, and a proportionally reduced energy. The scientific basis for this recommendation was summarized succinctly in the transmittal letter of HEPAP Chairman Professor Francis Low to Dr. James Decker, Acting Director of the Office of Energy Research:

> "The Subpanel has concluded on physics research grounds that any substantial reduction in the energy of the SSC would compromise our ability to elucidate the nature

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*The report of this subpanel, whose membership included Dr. Lee and Dr. Drell as chairman, accompanies this statement.

> of electroweak symmetry, a truly fundamental problem at the core of the Standard Model. This is because, with 20 TeV beams, there is a confidence that these phenomena can be studied in whichever form they take, whereas, this confidence is quickly lost at lower energies. In addition, no substantial increase of luminosity can make up for a reduction in energy because no multipurpose detector is capable of operating well above 10^{33} cm^{-2} sec^{-1}, the design luminosity of the SSC. Only limited purpose, specially designed detectors can operate at higher luminosities, and these are not capable of thorough exploration of the phenomena in question."

In essence the scientific judgment is that such a reduction would unacceptably increase the risk of missing important new physics which is the very goal of building SSC.

Finally we comment that SSC will be a unique facility well into the next century. It will represent a great step by a factor of ten or more beyond any other accelerator now operating or under construction. CERN in Geneva is seriously considering constructing a proton-proton collider in the existing 17-mile-circumference tunnel for its currently operating Large Electron-Positron (LEP) accelerator. However, the SSC with its 54-mile tunnel and 20 TeV beam energy compared with the 8 TeV design maximum at the CERN design concept, will have the unique potential to explore a wide range of physics in the energy range we believe crucial for our discovering the exciting new phenomena for understanding symmetry breaking and particle masses that are the primary goal of SSC physics.

3) How important is it for the United States to invest in science, and in high energy physics in particular? What practical benefits to society can be expected to result from the SSC?

When construction of the SSC was recommended by President Reagan in 1988, and reaffirmed by President Bush in 1989, it was identified as a national goal. At the same time a commitment was made to maintain support for a strong and broad-based national program. This is an important commitment because high quality scientists and engineers are a national resource of the United States. This technical community is a critical ingredient in our national effort to remain a world leader in technical innovation, to maintain a strong economy and high standard of living, to flourish in competitive high-tech industries, and to meet our goals in national security.

The SSC will be an important component in training and maintaining a U.S. technological edge. For many decades into the next century it will be a unique tool ensuring U.S. leadership and helping train outstanding young American scientists and engineers, and students from more than one hundred American universities in the most sophisticated and demanding new technologies.

More than 50 years ago Ernest Lawrence at Berkeley and Merle Tuve here in Washington built the first large accelerators in the United States in order to study the structure of subnuclear matter. From that day to the present the excitement, the romance of probing nature's secrets with the most fundamental of all questions: "What are we made of?" has attracted the best scientific talent of this country.

SSC will assure continued U.S. leadership in this field that has been a source of great pride as well as a stimulant to important technical innovations in superconducting technologies and computer control of complicated systems. It will also be a boon and an important challenge to the highest-tech leadership of American industries whose experience and expertise will be relied on to build the 54-mile-long system of superconducting magnets and to construct the sophisticated detectors that must be designed to select those few events of crucial importance out of a background of hundreds of millions of interactions occurring each second.

Conclusion

To summarize, the physics community--American and world-wide--is excited by the prospect that the SSC will begin to provide data by the end of this decade. Through research, training and industrial manufacturing the SSC project will contribute to American technological strength. It will also be a magnet for scientific cooperation world-wide. It will advance our undertanding of the universe and it will help define the quality of our culture. It will indeed be an important legacy for us to give to the next generation of scientists of the 21st century.

MONDAY, MARCH 12, 1990.

ATOMIC ENERGY DEFENSE ACTIVITIES; WEAPONS ACTIVITIES; ARMS CONTROL; NUCLEAR SAFEGUARDS & SECURITY; INTELLIGENCE PROGRAMS; VERIFICATION AND CONTROL ACTIVITIES; SECURITY INVESTIGATIONS

WITNESSES

JOHN C. TUCK, UNDER SECRETARY, AND ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS, DEPARTMENT OF ENERGY

DR. ROBERT B. BARKER, ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY), DEPARTMENT OF DEFENSE

REAR ADMIRAL J. MICHAEL BARR, U.S.N., DEPUTY ASSISTANT SECRETARY FOR MILITARY APPLICATION, DEPARTMENT OF ENERGY

Mr. BEVILL. The committee will come to order.

Pursuant to the decision of the committee last Thursday, the hearing for today will be closed. Only those who have appropriate security clearances will remain in the room.

Secretary Tuck, will you see that only those who have appropriate clearances are in the room?

Mr. TUCK. I am informed that only those with appropriate clearances are in the room.

Mr. BEVILL. I would like to remind members not to remove any materials from the hearing room, as much of it is classified.

We have three witnesses who will be testifying today. We are pleased to have each of you. The Chair will recognize you, Secretary Tuck, at this time. You may proceed as you wish.

OPENING STATEMENT

Mr. TUCK. Thank you, Mr. Chairman. I am John Tuck, Under Secretary of Energy and Acting Assistant Secretary for Defense Programs. I am serving in this capacity at the request of Secretary Watkins pending Senate confirmation of Victor Stello to the Defense Programs' position. This post has been vacant for over two years. It needs to be filled. I have a detailed statement I would like to submit for the record and summarize it for the Committee this afternoon.

[The prepared statement of Mr. Tuck appears at the end of the hearing record.]

Mr. TUCK. I am pleased to appear before you today in support of the Department of Energy's Fiscal Year 1991 Defense Programs appropriation request of $7.5 billion. The request excludes funding for New Production Reactors, Environmental Restoration and Waste Management, Waste Transportation and Site Management, and the Naval Reactors Program, which are administratively separate from Defense Programs, but are part of the overall national security budget function.

Seated next to me at the table this afternoon are the Assistant to the Secretary of Defense for Atomic Energy, Dr. Robert Barker; and the Deputy Assistant Secretary for Military Application, Rear Admiral Michael Barr.

Also in attendance are the acting Deputy Assistant Secretary for Nuclear Materials Production, Richard Starostecki; the Acting Deputy Assistant Secretary for Security Affairs, William Barker; representing the Deputy Assistant Secretary for Intelligence, Robert Walsh, is Eugene Bacher; representing the Director of the Office of Arms Control, Vic Alessi, is Anthony Czajkowski; and the Acting Deputy Assistant Secretary for Planning and Resource Management, David LeClaire. Dr. Barker and Rear Admiral Barr will provide detailed testimony later this afternoon.

Tomorrow morning, Richard Starostecki will provide testimony on the Nuclear Materials Program; followed by the Director of the Office of New Production Reactors, Dr. Dominic Monetta, who will discuss the New Production Reactors Program; and then representatives from the Defense Nuclear Facilities Safety Board.

Dr. Barker, Mr. Walsh, and Dr. Alessi have detailed prepared statements which I would like to submit for the record. I will aslo address their respective program areas in my overview.

[The prepared statements appear at the end of the hearing record.]

Mr. Tuck. I would like to thank the Appropriations Committee for your continued support. Your actions have helped us change the culture at DOE and set a new course for the future. I will begin by offering some perspectives on the changing world scene, discuss the Defense Programs Mission, address the challenges we are facing, and close with a discussion of Defense Programs budget needs.

THE CHANGING WORLD SCENE

As the Congress is well aware, the world is in a state of flux. The threat from conventional forces is diminishing; however, the Soviets still possess a formidable arsenal of strategic weapons. They continue to develop and deploy a growing number of new and improved missile delivery systems. Their production of nuclear materials continues unabated, [deleted].

In today's unstable environment, we need to maintain the capability to respond to a variety of threats while negotiating with the Soviet Union for an orderly reduction in the number of strategic systems.

We have learned an important lesson in this country. For nuclear deterrence to be successful, it must be achieved in a safe and environmentally acceptable fashion. This Nation cannot afford to meet production requirements at the expense of safety and the environment.

[Chart 1.]

DEFENSE PROGRAMS

CHART 1

UNCLASSIFIED

DEFENSE PROGRAMS MISSION

- SUPPORT NATIONAL SECURITY POLICIES OF THE UNITED STATES FOR A NUCLEAR DETERRENT
  - CONDUCT ALL OPERATIONS IN A SAFE, SECURE AND ENVIRONMENTALLY RESPONSIBLE MANNER
  - CONDUCT RESEARCH AND EXPERIMENTS ON THE MILITARY APPLICATION OF ATOMIC ENERGY
  - PRODUCE AND MAINTAIN NUCLEAR WEAPONS AND NUCLEAR MATERIALS, AND MANAGE GENERATED WASTE
  - ASSESS FOREIGN NUCLEAR WEAPONS CAPABILITIES AND COMPLIANCE WITH TREATIES
  - PROVIDE SAFEGUARDS AND SECURITY FOR NUCLEAR WEAPONS, DEVICES, MATERIALS, FACILITIES, AND INFORMATION

UNCLASSIFIED

The Department of Energy's Defense Programs Mission, shown on Chart 1, contributes to national security by supporting the development, production and maintenance of a credible, safe, and reliable nuclear deterrent. Defense Programs oversees the manufacture, maintenance, and retirement of the weapons components and nuclear materials comprising our nuclear stockpile.

Significant efforts are directed toward assuring that the Department's nuclear weapons, materials, facilities, and classified information are protected adequately. In addition, verification and control technology efforts are directed at assisting other agencies in analyzing our adversaries' capabilities, compliance with existing treaties, and development of new verification technologies.

The Nation's ability to produce nuclear materials in support of our defense responsibilities has been severely limited due almost entirely to environmental, safety, and health problems. The problems we are facing are the result of a culture which placed the highest priority on production.

Facilities throughout the defense complex have been allowed to deteriorate with no firm, integrated, and comprehensive plans for their modernization. Lessons learned in the civilian nuclear power industry have been ignored. Oversight of contractor activities has been inadequate and, in some cases, conducted by personnel not possessing the requisite scientific, managerial, and technical skills to oversee these highly complex activities.

ACTIONS TAKEN TO DATE

We have initiated a major reorganization within Defense Programs to establish clear and direct lines of management responsibility—the Managers of the Savannah River Operations Office and the Rocky Flats Office now report to the Assistant Secretary for Defense Programs. Additionally, the Headquarters element has been realigned to provide added resources, clearer lines of authority, and enhanced capability to oversee field operations.

The recent increase in Federal pay, effective in January 1991, will provide some relief in acquiring personnel with the sorely needed technical skills to manage the Department's defense programs. However, we still need Congressional support to enable scientists and other highly qualified individuals in the national laboratories or retired from the military to serve in the Department of Energy without jeopardizing their existing financial benefits.

On June 27, 1989, Secretary Watkins announced a 10-point plan to move the Department aggressively toward full accountability and compliance with environmental, safety, and health requirements. Details of the plan, as well as future initiatives, are contained in Secretary Watkins' posture statement and budget overview for the Department of Energy, which was recently provided to each Member of Congress.

One such initiative involves restructuring the existing system of award fee contracts for the defense production complex. Compliance with environmental, safety, and health laws and concerns now constitutes at least 51 percent of the contractors' semi-annual award fee evaluation.

In addition, DOE has established independent "tiger teams" to conduct environmental compliance assessments; provided access to DOE nuclear facilities for State officials monitoring environmental, safety, and health compliance; moved to strengthen technical capabilities of line management and oversight personnel; mandated compliance with OSHA standards in defense complex modernization plans; improved DOE procedures for compliance with the National Environmental Policy Act; established a new management team within the Department's Office of Defense Programs to emphasize safety over production; accelerated the cleanup of DOE facilities; initiated development of a comprehensive epidemiological data respository containing information on past and present DOE workers; and appointed an independent advisory panel to evaluate changes needed in the Department's epidemiological program.

[Chart 2.]

DEFENSE PROGRAMS

CHART 2

FY 1991 DEFENSE PROGRAMS BUDGET

- o EMPHASIZES ACTIVITIES TO BRING DP FACILITIES INTO COMPLIANCE WITH APPLICABLE REGULATIONS
- o SUPPORTS INTENSIVE EFFORTS TO IMPROVE OPERATIONS AT SAVANNAH RIVER AND ROCKY FLATS
- o PROVIDES DELIVERY OF NEW WEAPONS AND STOCKPILE IMPROVEMENTS TO EXISTING WEAPONS TO THE DEPARTMENT OF DEFENSE
- o MAINTAINS ADEQUATE RD&T BASE
- o SUPPORTS TECHNOLOGY TRANSFER TO PRIVATE SECTOR
- o PROVIDES INCREASE FEDERAL STAFFING TO IMPROVE MANAGEMENT OF DP OPERATIONS
- o SUPPORTS GOAL FOR ELIMINATING SECURITY INVESTIGATIONS BACKLOG BY 1993
- o CLOSES OUT SPECIAL ISOTOPE SEPARATION PROGRAM

The Department's fiscal year 1991 Defense Programs $7.5 billion budget request has been structured to effect the following goals: bring our facilities into compliance with all Federal and State agreements and regulatory requirements; continue operational improvements at Savannah River and Rocky Flats; meet weapons production and nuclear material requirements as agreed to with the Department of Defense; maintain an adequate weapons research, development, and testing capability; support the transfer of technology to the private sector where appropriate; improve management of Defense Programs operations through increased Federal staffing; continue efforts to reduce the backlog of security reinvestigations; and close out the Special Isotope Separation program.

[Chart 3.]

DEFENSE PROGRAMS

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CHART 3

DEFENSE PROGRAMS
FY 1991 REQUEST
(DOLLARS IN MILLIONS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1991 REQUEST
RESEARCH, DEV. AND TESTING	$1,839	$1,864	$1,885
PRODUCTION AND SURVEILLANCE	2,104	2,375	2,757
PROGRAM DIRECTION	83	99	106
NUCLEAR MATERIALS PRODUCTION	1,943	2,092*	2,413
VERIFICATION AND CONTROL TECH.	155	166	174
SAFEGUARDS AND SECURITY	79	85	91
SECURITY INVESTIGATIONS	43	41	65
SUBTOTAL DEFENSE PROGRAMS	$6,246	$6,722	$7,491
(% CHANGE)			(+11.4%)

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* INCLUDES $135 MILLION FROM DOD

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The $7.5 billion budget request for the Department's Defense Programs in fiscal year 1991 represents an 11-percent increase over the fiscal year 1990 appropriation. Chart 3 compares the fiscal year 1991 funding request to the fiscal year 1990 appropriation for each program.

[Chart 4.]

DEFENSE PROGRAMS

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CHART 4

DEFENSE PROGRAMS
SUMMARY OF CHANGES FROM FY 1990
(DOLLARS IN MILLIONS)

FY 1990 CONGRESSIONAL APPROPRIATIONS	$6,722
ESCALATION	+ 280
SAVANNAH RIVER OPERATIONS	+ 338
ROCKY FLATS INITIATIVE	+ 155
INCREASED SECURITY INVESTIGATIONS	+ 23
WEAPONS TRANSPORTATION SAFEGUARDS INITIATIVE	+ 20
INCREASED FEDERAL STAFFING	+ 14
MONSANTO PARTIAL CONTRACT SETTLEMENT	+ 23
WEAPONS RD&T	- 63
SIS CLOSEOUT	- 56
BASE PROGRAM (MAINTENANCE/SAFETY & HEALTH/ETC)	+ 35
FY 1991 CONGRESSIONAL REQUEST	$7,491

UNCLASSIFIED

INCREASES OVER FY 1990

Consistent with the Department's changing priorities, Chart 4 presents the areas of major funding changes from fiscal year 1990 to fiscal year 1991. The largest increase, $338 million, is for continuation of reactor safety and support facility improvements at the Savannah River site.

The fiscal year 1991 budget request also provides an additional $155 million for operational improvements at Rocky Flats. Admiral Barr and Mr. Starostecki will cover these increases as well as the overall weapons activities and nuclear materials program in more detail later.

Of significant concern is the fact that in order to meet the high priorities of Savannah River and Rocky Flats, the Weapons Research, Development and Testing program could not be supported at the desired level. This program element, which represents the base upon which our nuclear deterrent is founded, as well as much of our investment in the future, must be supported.

FY 1990 REPROGRAMMING REQUEST

A related funding matter I wish to briefly discuss with you today is the need for your urgent support of our recent request to reprogram $291 million in fiscal year 1990 from the Atomic Energy Defense Activities appropriation, as well as transfer $135 million from DOD to the Department of Energy.

Approval will enable us to continue our efforts to upgrade the Savannah River reactors for restart, continue the defense production complex on an approach toward achieving compliance with applicable regulations, strengthen security protection, improve and broaden Federal management oversight, and place the N Reactor at Richland, Washington, in a dry standby status. Your prompt action on this request will allow us to move expeditiously on these important actions.

[Chart 7.]

DEFENSE PROGRAMS

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CHART 7

FY 1991 BUDGET REQUEST
SECURITY AFFAIRS
(DOLLARS IN MILLIONS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1991 REQUEST
VERIFICATION AND CONTROL TECH.	$ 155	$ 166	$ 174
SAFEGUARDS AND SECURITY	79	85	91
SECURITY INVESTIGATIONS	43	41	65
TOTAL SECURITY AFFAIRS	$ 277	$ 292	$ 330
(% CHANGE)			(+13.0 %)

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SECURITY AFFAIRS

I would now like to briefly discuss the Security Affairs portion of Defense Programs, which includes the Verification and Control Technology program, the Nuclear Safeguards and Security Program, and the Security Investigations Program. The fiscal year 1991 budget request for these programs totals $330 million, a 13-percent increase over the fiscal year 1990 appropriation.

VERIFICATION AND CONTROL TECHNOLOGY

The Verification and Control Technology Program supports the development and execution of U.S. national security and foreign policy interests in the areas of treaty verification, intelligence, and arms control.

We have developed, or are developing, systems to verify compliance with the Limited Test Ban Treaty, Threshold Test Ban Treaty, Peaceful Nuclear Explosions Treaty, and Intermediate Nuclear Forces Treaty, as well as a future Strategic Arms Reduction Treaty, Chemical Warfare Treaty, Conventional Forces in Europe Treaty, and the Open Skies Initiative.

Secretary Watkins has expanded our capabilities to provide foreign intelligence in support of such departmental and national policies as the development of a comprehensive national energy strategy, safe and environmentally sound disposal of radioactive waste, strengthening the domestic energy industry's ability to compete in the international marketplace, and responding to the challenge of potential global climate change.

NUCLEAR SAFEGUARDS AND SECURITY

The Nuclear Safeguards and Security Program is responsible for establishing policy and sponsoring research and development into measures to assure adequate protection of the Department's nuclear weapons, materials, facilities, and classifed information against theft, sabotage, espionage, and terrorist activities.

Technical support is also provided for international activities designed to minimize the proliferation of nuclear weapons. The fiscal year 1991 request of $91 million will provide a balanced program, with emphasis on strengthening protection against the potential insider threat.

SECURITY INVESTIGATIONS

The fiscal year 1991 budget request of $65 million will enable the Department to continue to conduct initial investigations for new employees while significantly reducing the backlog of overdue reinvestigations.

Additional security investigation requirements result from increased remedial efforts underway at Savannah River and Rocky Flats, and implementation of the Personnel Security Assurance Program for personnel involved with nuclear explosives, components, and special assemblies.

Over the last year, we have established new goals, initiated a major change in the DOE culture, and developed new budget plans to achieve our objectives. Our efforts to correct deficiencies within the Department, we think, are at long last bearing results.

DEFENSE PROGRAMS

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CHART 8

FY 1990/1991 CONCERNS

- TIMELY RESTART OF SAVANNAH RIVER
- RESUMPTION OF OPERATIONS AT ROCKY FLATS
- ABILITY TO MEET DOD REQUIREMENTS
- NEW REQUIREMENTS FROM TIGER TEAM INVESTIGATIONS
- FUNDING FOR FUTURE VERIFICATION REQUIREMENTS
- DOWNWARD TREND IN RESEARCH, DEVELOPMENT AND TESTING

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We have concerns, and there are risks associated with accomplishing our objectives on schedule. While we believe the Savannah River reactor restart schedule will be achieved, there are concerns associated with the timely resumption of operations at Rocky Flats and our ability to meet future DOD requirements.

Other uncertainties, for which funding has not been included in our fiscal year 1991 budget request, are the unknown requirements which may be identified by our tiger team investigations; and verification requirements which aren't in place today.

We are also concerned about the continued downward trend in our weapon research, development and testing program. In the present time of major change, the weapon research, development, and testing program represents our ability to respond and the fundamental capabilities which must be supported.

I look forward to working with the Congress to secure the necessary resources and support to carry out effectively and completely the Department's important mission.

At this time, I will be pleased to answer any questions you may have.

[The prepared statement of Mr. Tuck appears at the end of the hearing record.]

Mr. BEVILL. Thank you.

Dr. Barker, the Chair recognizes you.

DOD SUPPORT FOR DOE'S BUDGET

Dr. BARKER. I am pleased to appear here today, for both the Nuclear Weapons Council and the Department of Defense, in support of the Department of Energy's budget request for fiscal year 1991.

As Mr. Tuck indicated in his opening remarks, we certainly are in a time of flux in which none of us knows what the newspapers will bring tomorrow.

The Defense Department certainly has looked at the requests that we have made of the Department of Energy in that light, and firmly believe that the production requirements made for the fiscal year 1991 budget are requirements that meet any conceivable future that we are able to imagine.

We also believe the research and development objectives set out in this budget are prudent until we have a better chance to evaluate the direction this new future world will take us.

I do want to make these comments in the context that the Department of Defense is clearly undergoing a major examination of its own requirements in the fiscal year 1992–1997 timeframe.

A year from now, you could find me appearing before you with requirements in the outyears that are somewhat different from those I will discuss today.

DOD FY 1991 REQUIREMENTS

As far as fiscal year 1991 is concerned, I think our requirements are well-funded and do indeed deserve your support. The nuclear weapons production called for in the 1991 budget will allow for the continued introduction of modern safety and security features in the bombs that are in the current inventory. They will allow for production of the Trident II missile warheads and production of warheads for the sea-launched cruise missile. All of these requirements are very, very important considering the spectrum of potential world futures one can imagine. Both Departments share the regret that the modernization of the bombs is not proceeding more rapidly because of the current state of affairs at the Rocky Flats facility.

The Department of Energy's budget also supports the research and development efforts upon which we will depend for the nuclear weapons concepts which will maintain a credible nuclear deterrent for the foreseeable future.

A robust nuclear test program is critical to this research and development effort. In fiscal year 1991, we look to DOE to support national security requirements by continuing their development efforts for a warhead for the 155-millimeter artillery shell, for the SRAM-II missile, a B-90 depth strike bomb to replace the quite aged B-57 bomb in the current inventory, and to continue development work on a warhead for the tactical air-to-surface missile and for a missile to replace the aging Lance missile.

ENVIRONMENT AND SAFETY REQUIREMENTS

None of the requirements of the Department can be met without a DOE complex which can operate safely while insuring that the environment remains healthy.

The Department of Energy has a serious challenge, namely, to keep the doors open—to keep defense requirements met while operating safely and in an environmentally sound manner. I think both Departments fully appreciate that unless the complex can be operated safely and in an environmentally sound manner, it will not operate at all.

The bottom line, of course is to continue to meet defense requirements while operating in this safe and environmentally sound manner

[Deleted.] Our expectations, and the hopes of the Defense Department, were that when a defense program slipped into the outyears, the Department of Energy would be able to accelerate what we call stockpile improvement programs. That is, programs that increase the safety of weapons in the inventory by retrofitting them.

[Deleted.]

So, we have retired aging bombs, we have retired aging elements of our tactical nuclear capability, without replacement. We are also retiring substantial numbers of sea-based ballistic missiles with the retirement of the Poseidon submarines.

Two years from now, that situation will not hold. Two years ago, it would not have held. Only at this time were we able to sustain the shutdown of the Savannah River site. It is a situation that cannot be sustained, and the rapid restart of those facilities is critical [deleted].

We indeed support full funding to restore the Savannah River complex and the Rocky Flats complex to full operation.

NEED FOR NEW TRITIUM PRODUCTION

New tritium production is going to be needed for the long haul. We also were strong supporters of the New Production Reactor Program of the Department of Energy. We need to be prepared to provide tritium as long as we have nuclear weapons in existence.

If we are going to have a reliable supply of tritium beyond the year 2000, we still need full implementation of the Department's new reactor program.

NUCLEAR WEAPONS COUNCIL

I now want to touch briefly on a few items. One, I want to comment on the Nuclear Weapons Council. I want to touch on what I think is my state-of-the-stockpile message to the committee, the shared stockpile this committee created over the years, and comment on the status of the safety features and their implementation in the stockpile.

The Nuclear Weapons Council, of which I am the Staff Director and Executive Secretary, has continued to be the major interface between the Department of Energy and Department of Defense. We prioritize weapon procurements and address issues that fall into the domain of both Energy and Defense.

The significant responsibility of the Nuclear Weapons Council is the annual Nuclear Weapons Stockpile Memorandum by which the two Departments combine together defense requirements and DOE's ability to meet those requirements, making a recommendation on the stockpile to the two Secretaries, which is approved by the President.

The Nuclear Weapons Council has worked diligently on the Nuclear Weapons Stockpile Memorandum this year, but we have not managed to finalize the document due most significantly to DOE's continuing difficulties in being able to maintain the production complex in a fully operating form.

NUCLEAR WEAPONS SAFETY COMMITTEE

One of the most significant steps that the Council has probably taken in this last year is the establishment of a subordinate committee called the Nuclear Weapons Council, Nuclear Weapons Safety Committee. This committee provides a joint body of the Department of Defense and Department of Energy to look at safety, in isolation, to provide a view unencumbered by fiscal realities and operational requirements. This provides the Nuclear Weapons Council and the two Secretaries with an unencumbered view on safety.

This group has just begun its operation. Admiral Barr is its Chair. It incorporates members from both Energy and Defense and has as technical experts, representatives from the three nuclear weapons laboratories, and the Defense Nuclear Agency.

I think the rest of the work of the Nuclear Weapons Council in the last year has been what you would call routine. But this is a very, very important routine; namely, the routine spelled out in the law establishing the purpose of the committee.

We are going to start the new year with three new faces. In the absence of an Assistant Secretary for Defense Programs, Mr. Tuck has attended one meeting representing the Department of Energy. We have a brand new Vice Chairman of the Joint Chiefs of Staff, Admiral Jermiah.

With the Senate confirmation of Dr. Herzfeld last week, we will have a brand new Director of Defense Research and Engineering as chairman of the committee. Mr. Tuck is, therefore, the most experienced member of the committee.

Having talked with all three members, I know they are eager to pursue and implement their responsibilities.

STATUS OF THE NUCLEAR WEAPONS STOCKPILE

Two years ago, I began the process of giving you a report on the status of the stockpile. It is interesting to sit back and annually take a snapshot of what has happened.

Last year, I told you that during the eight years of the Reagan Administration, the size of the nuclear weapons stockpile declined. [Deleted.] In the one year ending December 31, 1989, the total numbers of nuclear weapons in the inventory decreased by [deleted] as fewer weapons were built than were retired in the last calendar year.

The yield of the stockpile is [deleted] megatons. I remind you that in 1960—that total was [deleted] megatons. It is down a factor of four from what it was in the early days and continues to decline. The largest single weapon in the inventory continues to be the B-53 bomb, [deleted]. The smallest weapon in the inventory at the other extreme is the W-48, 155-millimeter artillery shell, [deleted].

The oldest weapon type is the W-33, the eight-inch artillery fired atomic projectile, [deleted]. The oldest individual weapon in the stockpile is the B-28 bomb, produced in 1958. It is still awaiting the production of B-83 bombs with modern safety and security features so that we can retire the B-28 weapons. [Deleted.]

We still have 25 weapon types in the inventory. In the next three years, we will retire five of those 25. It is our intent to put five new types into the inventory. [Deleted.]

In the same three year timeframe, we will be introducing five new warhead types. [Deleted.]

The President's budget for DOE defense program actions balances the need for renovation of the fragile and aging nuclear weapons complex with environmental restoration and with the competing goal of maintaining a safe, reliable, and effective stockpile.

We do need to keep replacing these older weapons in the inventory. Continued modernization enhances the safety of deployed weapons and deserves the priority commensurate with the establishment and maintenance of a safe production facility. [Deleted.]

The stockpile requirements for the future, as I noted earlier, are under serious reevaluation this year, in conjunction with the DOE fiscal years 1992-1997 review. We will be giving a very hard scrub to nuclear weapons requirements in the outyears, but we still anticipate a need for all of the weapons system I have mentioned.

What will be at issue will be the numbers as we examine the alternatives of a future world.

NUCLEAR WEAPONS SAFETY

In the past two years, I have shown you vugraphs of the rate at which we are improving the safety, security, and use control features in the stockpile. I decided not to show you the same vugraphs again this year. [Deleted.]

These safety and security and use control features that I have talked about require a continued and aggressive Department of Energy Complex capable of production and testing modern weapons.

We are going to need this complex in a healthy state in order to be able to achieve safety, security, and use control goals I mentioned.

CONCLUSION

Let me summarize. I look forward to your questions later. As we see it, deterrence will remain critical to United States national security. To maintain that deterrence, we, the Department of Defense, depend upon a strong DOE program activity.

Continue modernization for strategic and non-strategic nuclear forces will remain essential. Numbers may decline, but the kinds of weapons systems won't change significantly.

A safe, secure, and effective nuclear deterrent requires a modernized DOE nuclear weapons complex capable of operating safely with minimum environmental disturbance. We look to this committee's support to make sure we have that capability on the DOE side.

We look forward to your support for their ability to do that. I thank you.

[The prepared statement of Dr. Barker appears at the end of the hearing record.]

Mr. BEVILL. The Chair recongizes Admiral Barr.

DOE WEAPONS PROGRAM

Admiral BARR. It is a pleasure to appear before you today to testify in support of the Atomic Energy Defense Activities budget request for fiscal year 1991.

This afternoon, I will discuss some of the good things that have happened in the weapons program, and briefly highlight our budget request. I will also discuss several concerns.

[Slides follow:]

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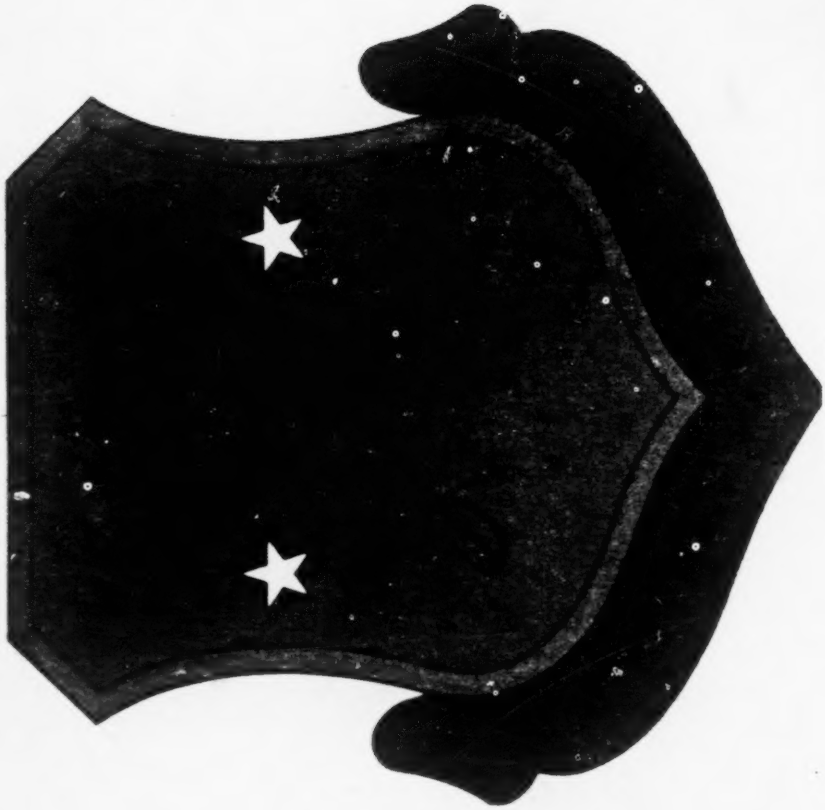

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DEFENSE PROGRAMS WEAPONS ACTIVITIES

WEAPONS PROGRAM MISSION

- Support U.S. National Security Policy
  - Conduct All Weapons Complex Operations in a Safe and Environmentally Responsible Manner
  - Produce, Maintain, and Retire Nuclear Weapons
  - Conduct Research, Development, and Testing for Military Applications
  - Assess Potential Adversary Threats and Provide Credible Options for Nuclear Deterrence

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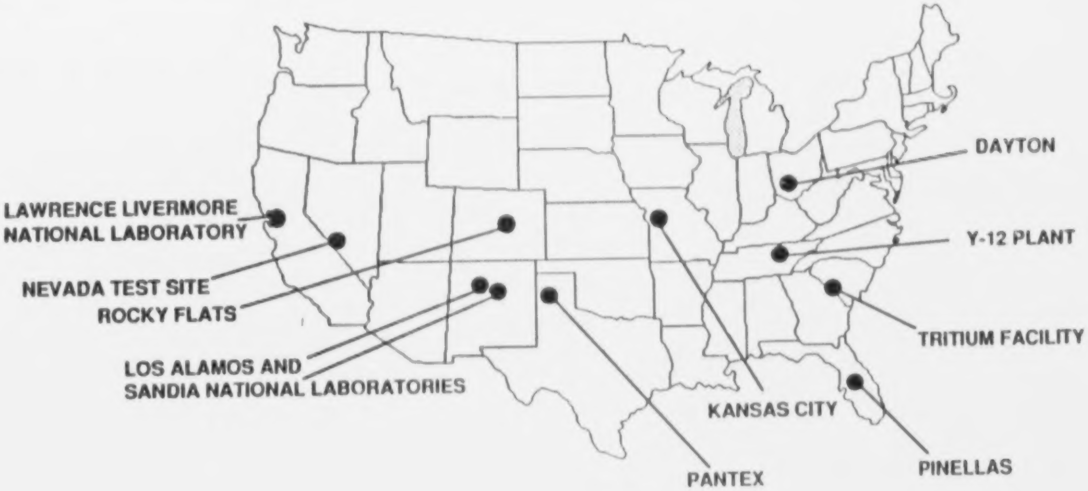
WEAPONS PROGRAM FACILITIES


LAWRENCE LIVERMORE NATIONAL LABORATORY
NEVADA TEST SITE
ROCKY FLATS
LOS ALAMOS AND SANDIA NATIONAL LABORATORIES
PANTEX
KANSAS CITY
DAYTON
Y-12 PLANT
TRITIUM FACILITY
PINELLAS

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DEFENSE PROGRAMS WEAPONS ACTIVITIES

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PRIORITIES

- Comply with Environmental, Health, and Safety Laws, Regulations, and Agreements
- Comply with DOE Orders and Instructions
- Production
- Non-critical Maintenance
- Performance Improvement

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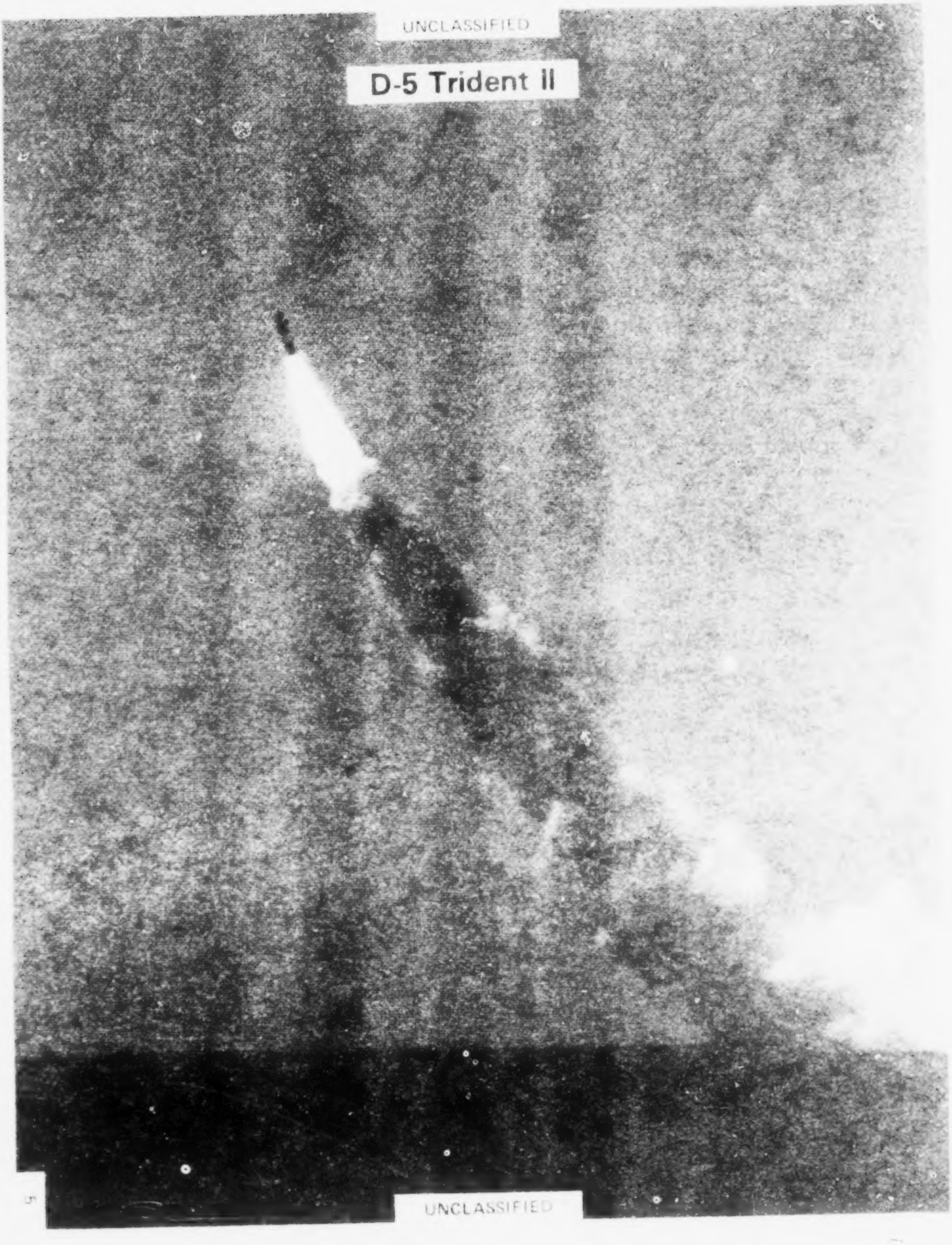
The overall mission of the program remains unchanged. There are the three important principles that apply to our mission for the nineties. These are that there must be compatibility between our mission to develop and produce nuclear weapons and protection of the environment, and additionally, to protect the safety and health of workers and the public. There must be dedication to excellence in all our endeavors. We must welcome constructive criticism about all levels of our operations. These principles are goals to be attained and serve as benchmarks to measure our progress toward affecting a positive cultural change that our Secretary desires.

I also believe that those principles are the best way to allow the DOE to continue to support our nuclear deterrent.

WEAPONS PROGRAM ACCOMPLISHMENTS

Looking back to last year, we again fulfilled our obligation for weapons production deliveries. [Deleted] new or modified weapons were produced and delivered to the DOD, including first deliveries of the W-88 warhead for the D-5 Trident II submarine-launched ballistic missile.

[Slide follows:]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D-5 Trident II
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During the past year, we have started to implement the Secretary's 10-point plan.

We have a clearly articulated list of weapons program priorities that begins with "comply with environmental, safety and health laws, regulations and agreements." And this has substantial impact on budget priorities.

We are taking steps to increase formality of operations, through training on what "formality of operations" means, to improve facility documentation and procedure, and implementing management accountability and authority.

We have placed increased emphsis on headquarters oversight of facilities and operations by starting reorganization of my staff and restructuring some field reporting relationships to ensure much closer coordination than existed in the past.

We are also striving to increase the number of technically qualified people working in headquarters and the field. Finding the right people is difficult. Our task would be made easier if Secretary Watkins initiatives to make some more competitive with the private sector, to lift certain limitations on post-retirement employment for some military personnel were adopted.

[Slide follows.]

DEFENSE PROGRAMS - WEAPONS ACTIVITIES

FY 1991 CONGRESSIONAL BUDGET REQUEST SUMMARY
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Research, Development, & Testing			
Core	$1,435.6	$1,480.2	$1,525.9
NDEW	240.3	214.4	191.9
Inertial Fusion	163.5	169.2	166.8
	$1,839.4	$1,863.8	$1,884.6
Production & Surveillance	2,103.9	2,374.5	2,757.0
Total Weapons Activities	$3,943.3	$4,238.3	$4,641.6
		+7.4%	+9.5%

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WEAPONS PROGRAM BUDGET

I would like to summarize the weapons activities budget request. As shown on this chart, the fiscal year 1991 budget request is over $4.6 billion, a 9.5 percent increase over 1990.

This budget is a product of shifting priorities. We are emphasizing formality and discipline of operations, continuing to upgrade our performance in environmental, safety, and health matters, and improving our commitments to modernization and maintenance of the complex. To do this with current fiscal limitations is going to mean less production, less testing, and less research and development.

We have formulated our programs for fiscal year 1991 to try to provide a balance among all of these competing demands.

[Slide follows:]

DEFENSE PROGRAMS - WEAPONS ACTIVITIES

PRODUCTION AND SURVEILLANCE
TOTAL FUNDING
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Operating Expenses	$1,793.8	$1,968.2	$2,299.9
Capital Equipment	103.8	113.4	128.6
Construction	206.4	292.9	328.5
Total P&S	$2,103.9	$2,374.5	$2,757.0

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WEAPONS PRODUCTION AND SURVEILLANCE

I would now like to briefly review the individual program budget requests, starting with production and surveillance.

The budget request for production and surveillance activities increases 16 percent from fiscal year 1990 to fiscal year 1991, mainly due to growth in ES&H, maintenance, and initiatives for training and transportation in the production support area. Funding directly related to production increases less than 2 percent.

[Slide deleted.]

PRODUCTION WORKLOAD

This chart displays the weapon deliveries, new builds and stockpile improvements, as well as retirements and the equivalent workload trend. For fiscal year 1991, the total stockpile will be around [deleted] it has decreased by about 10 percent since 1985.

The Departments of Defense and Energy are working to establish production requirements that are balanced and realistic in terms of current needs, and take into consideration competing demands for future DOE funding. Expected DOE funding will not support the deliveries shown for 1992 and beyond.

Several changes have occurred since my predecessor testified last year. [Deleted.]

Including these delays, [deleted] weapons less than anticipated a year ago will be delivered in fiscal year 1990 and [deleted] fiscal year 1991. This is due to a combination of program slips and funding constraints. [Deleted.] We are working with the DOD to minimize these impacts.

The budget request supports production activities for [deleted] fiscal year 1991, and pre-production activities for eight systems.

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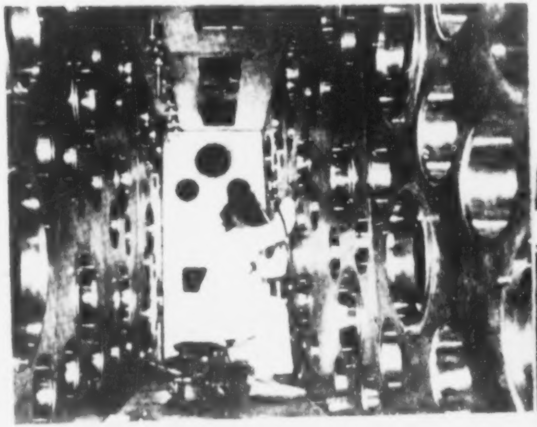
Production and Surveillance Initiatives



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PRODUCTION AND SURVEILLANCE BUDGET

We are proposing four initiatives within the P&S budget in fiscal year 1991:

The largest is $155 million for upgrades to the Rocky Flats plant. I will talk more about this in a few minutes.

Closely related to this request is an additional $23 million for training, consistent with the requirements of the new DOE Order on performance-based training for personnel operating non-reactor nuclear facilities. These funds will be targeted at Rocky Flats for fiscal year 1991.

Another initiative supports our commitment to enhance nuclear weapon safety. The request contains $19.7 million to continue to expand DOE's safe/secure transportation network with 12 additional safe secure trailers and associated equipment and couriers.

These are required because, currently, some weapons in DOE custody which contain coventional high explosive are shipped by air. This initiative will permit ground shipment, within the contiguous United States, of all of these weapons by 1993. This change will reduce the risk of plutonium dispersal in the event of a transportation accident.

Finally, we have requested $23 million to partially fund a contract closeout liability with the Monsanto Corporation. This will fund health benefits for Monsanto retirees from the Mound, Ohio plant.

[Slide follows:]

DEFENSE PROGRAMS - WEAPONS ACTIVITIES

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RESEARCH, DEVELOPMENT AND TESTING
TOTAL FUNDING
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Core Program	$1,435.6	$1,480.2	$1,525.9
Nuclear Directed Energy Weapons	240.3	214.4	191.9
Inertial Fusion	163.5	169.2	166.8
Total RD&T	$1,839.4	$1,863.8	$1,884.6

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RESEARCH, DEVELOPMENT, AND TESTING BUDGET

Turning to the research, development, and testing budget, the request for about $1.9 billion, an increase of only 1 percent over the fiscal year 1990 level. The breakdown between the Core Program, nuclear directed energy weapons research, and inertial fusion is shown on the chart.

The research, development and testing program plays an essential role in maintaining the credibility of our nuclear deterrent. The program develops new weapons and determines what is possible for the future.

RD&T also has responsibilities in maintaining and evaluating the current stockpile, including reliability, safety, testing, repair, modernization, and dismantling.

The laboratories are also important in providing the research and development to support our commitment to conducting environmentally sound operations, and the program plays an important role in arms control and verification research. This role may well increase if arms control efforts are successful, and might place additional demands on our resources.

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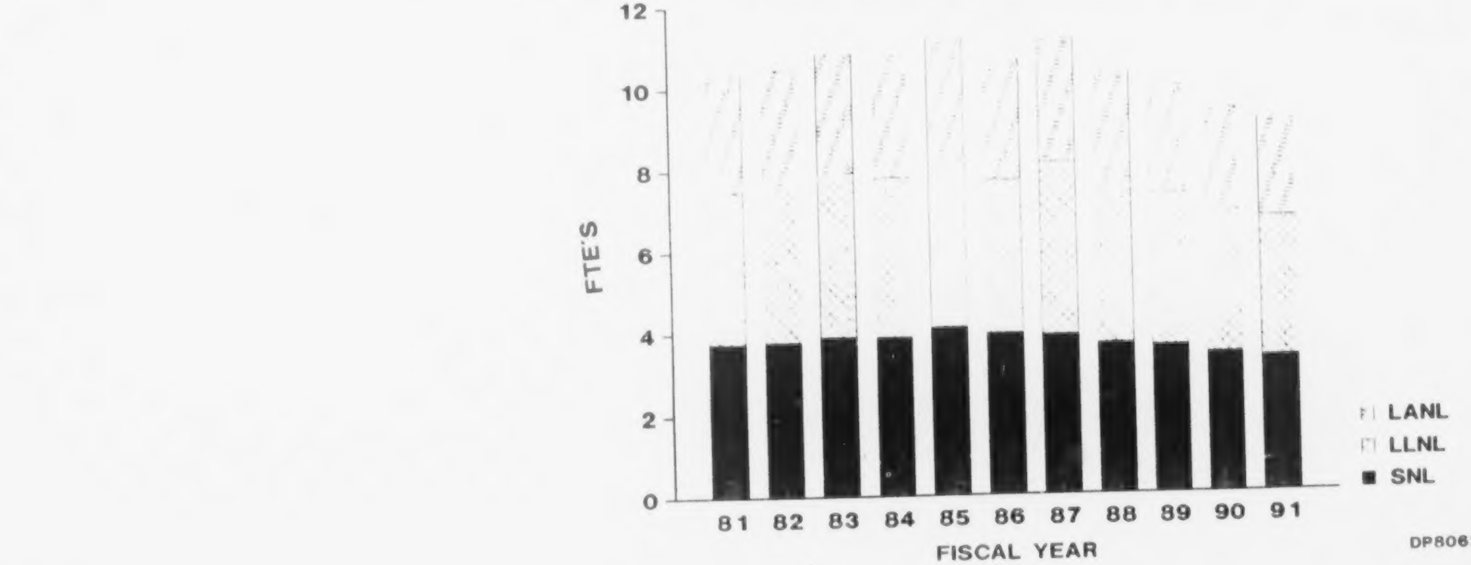
DEFENSE PROGRAMS - WEAPONS ACTIVITIES

RD&T LABORATORY FTE'S



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RD&T LABORATORY EMPLOYMENT

An issue of concern is the decline of laboratory employment supported by the weapons RD&T program. It is projected to decline about 2 to 3 percent from fiscal year 1990 to fiscal year 1991, a reduction of about 250 full-time equivalents.

Loss of these skilled people affects nuclear competence of the weapons program. Such skills are not available in the private sector, and when they are lost, they take many years to replace.

The downward trend of FTE's is primarily caused by changes in weapons program priorities resulting from increased emphasis in such things as safeguards and environment, safety, and health.

Once again, this situation reflects the realities of balancing competing demands within budget constraints.

[Slide follows:]

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DEFENSE PROGRAMS WEAPONS ACTIVITIES

RESEARCH, DEVELOPMENT, AND TESTING CORE PROGRAM SUMMARY ($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Operating Expenses			
Technology Base	$475.1	$475.2	$505.4
Weapons Dev., Eng. & Certification	441.5	448.0	468.5
Test Capabilities	175.3	182.7	187.0
Special Projects	69.7	77.2	90.0
Marshall Islands	4.9	5.3	5.0
Subtotal Oper.	$1,166.5	$1,188.4	$1,255.9
Capital Equipment	121.5	129.8	124.9
Construction	147.6	162.0	145.1
	$1,435.6	$1,480.2	$1,525.9

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RD&T CORE PROGRAM

A central part of the Core Program is the technology base, our expertise in essential scientific and engineering disciplines such as physics, materials science, and computations. It is the underpinning of the entire weapons program including threat assessment.

The threat assessment program seems likely to increase in importance. It is vital that we are not technically surprised and that we remain prepared to respond to new threats. We must maintain a vigorous program to assure that we understand fully what is technically possible, how to exploit it, and how it could be exploited against us.

Such knowledge is a principal factor in ensuring that no potential adversary could gain an advantage which would reduce the effectiveness of our nuclear deterrent.

The core program also funds weapons development engineering and certification, and operations at the Nevada Test Site.

The fiscal year 1991 request for the core program is just over $1.5 billion, a 3-percent increase over the fiscal year 1990 level.

TESTING

[Deleted] tests are planned for fiscal year 1991. We view this level with concern. It is well below the 20 tests per year that the weapons laboratories believe are needed to perform their mission responsibilities.

[Slide deleted.]

It is important to recognize that in a testing program this small, we have little or no flexibility to respond to technical problems or major design changes. [Deleted.]

ANNUAL REPORT ON TEST READINESS PROGRAM

The Department's first Annual Report to the Congress on the program for preparation for further limitations on nuclear testing has been completed. The report reflects the fact that the majority of the program elements requested by the legislation have been in place and operating for many years.

For example, the weapons program already includes a stockpile inspection and non-explosive testing program. Other activities, particularly those to improve predictive capability, have been given greater emphasis.

Since last year's testimony, the first phase of the Above-Ground Experimental Capability study has been completed, and we are nearing completion on the Remanufacturing-Substitution Study.

While we believe there will be some progress in the test limitation readiness program, it is our view that there will be limits on what can be accomplished. Nuclear testing will be required as long as we rely on a nuclear deterrent.

[Slide follows:]

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DEFENSE PROGRAMS - WEAPONS ACTIVITIES

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RESEARCH, DEVELOPMENT AND TESTING
INERTIAL FUSION
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Operating Expenses	$155.5	$160.6	$157.9
Capital Equipment	7.9	8.6	8.9
Subtotal IF	$163.4	$169.2	$166.8

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INERTIAL FUSION

Turning to Inertial Fusion, the fiscal year 1991 request is below the fiscal year 1990 level of effort, reflecting overall laboratory priorities.

The program provides a unique capability. In the near term, research and experiments in inertial fusion contribute to increased understanding of the phenomena that occur during a thermonuclear explosion.

In the long term, it may provide a means for simulating some aspects of a thermonuclear explosion in the laboratory and provide the capability to perform warhead survivability experiments. Also in the far term, there is a potential application to energy generation.

NAS REVIEW OF INERTIAL FUSION

At the request of the Congress, the DOE tasked the National Academy of Sciences to review the inertial fusion program during 1989. The interim report has been provided by the NAS Review Group. The final report should be available on September 15, 1990.

[Slide follows:]

DEFENSE PROGRAMS - WEAPONS ACTIVITIES

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RESEARCH, DEVELOPMENT AND TESTING NUCLEAR DIRECTED ENERGY WEAPONS
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Operating Expenses	$208.3	$181.9	$175.7
Capital Equipment	16.8	13.8	11.2
Construction	15.2	18.7	5.0
Subtotal NDEW	$240.3	$214.4	$191.9

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NUCLEAR DIRECTED ENERGY WEAPON RESEARCH

We conduct nuclear directed energy research to assess the threat to future defensive systems and to assess the vulnerability of our current strategic deterrent. The program integrates theory and experiment.

[Deleted.] We continued work on physics issues related to the hypervelocity pellet program. Optical laser concepts are also being explored.

[Deleted.]

The fiscal year 1991 budget request places the program at about 10 percent below the fiscal year 1990 levels. However, research on nuclear-directed energy weapons continues to be vital in carrying out our mission responsibilities for threat assessment.

The program will concentrate on completing ongoing research and analyzing data from 1989 and 1990 underground tests. New research and development, as well as future underground testing plans, have been scaled back consistent with overall priorities.

[Slide follows:]

DEFENSE PROGRAMS WEAPONS ACTIVITIES

UNCLASSIFIED

PRODUCTION AND SURVEILLANCE CONSTRUCTION SUMMARY
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Programmatic	$182.1	$259.9	$287.8
Environment, Safety, and Health	14.0	27.6	21.4
Safeguards & Security	10.3	5.4	19.3
Subtotal P&S	$206.4	$292.9	$328.5

DP8062211

UNCLASSIFIED

PRODUCTION AND SURVEILLANCE CONSTRUCTON

Turning briefly to our construction program, our goals are to restore and maintain the existing facilities as well as to provide new capability.

For the weapons P&S program, seven new project starts are included in fiscal year 1991. In addition, there are 10 new subproject starts requested under the Facilities Capabilities Assurance Program, FCAP, to continue replacement of critical areas throughout the P&S complex.

[Slide follows:]

UNCLASSIFIED

Plutonium Recovery Facility
Building 371

BUILDING 371

The most important ongoing construction project in the weapons complex is the modification of Building 371 at Rocky Flats. This project is needed to replace outdated and unreliable facilities, Buildings 771 and 776, which cannot be upgraded to meet today's environmental and safety criteria.

Regardless of whether the DOE ultimatley relocates plutonium processing from Rocky Flats, this project will be needed for more than 20 years to provide reliable processing capability using updated chemistry, reduce waste generation, and help eliminate backlogged residues now stored in drums.

We believe that there are no reasonable alternatives to completing this project. Building a new facility at another site is estimated to take eight to ten years, and cost over $1 billion. Other DOE plutonium processing sites, such as Los Alamos and Savannah River, have limited capacities for throughput—[deleted]—and limited capabilities to process certain feed materials and site returns.

Also a consideration is the increased risk and cost of additional cross-country shipments of plutonium and plutonium residues. Processing residues at the point of origin, in Building 371, is the most sound, safe, and secure approach.

The project is undergoing peer review to establish a detailed technical baseline. The current TEC has increased to a range of $500 to $600 million. This is up from $371 million established in 1987. About $50 million of the increase is attributable to delays in construction initiation. About $30 million is for process changes, while the remainder is to meet new safety standards, including redundant ventilation systems, electrical systems, instrumentation, and control.

The fiscal year 1991 request is $65 million to continue preliminary design and initiate long-lead procurements upon completion of the EIS process. The EIS process is about to start, and with a positive record of decision, construction will start in 1991. Project completion is scheduled for 1997. We are striving to meet the urgent need within DOE for modern, reliable plutonium processing capability.

[Slide follows:]

DEFENSE PROGRAMS WEAPONS ACTIVITIES

RESEARCH, DEVELOPMENT AND TESTING CONSTRUCTION SUMMARY
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 Request
Programmatic	$129.4	$163.6	$144.8
Environment, Safety, and Health	5.4	0.0	0.0
Safeguards & Security	28.0	17.2	5.2
Subtotal RD&T	$162.8	$180.8	$150.0

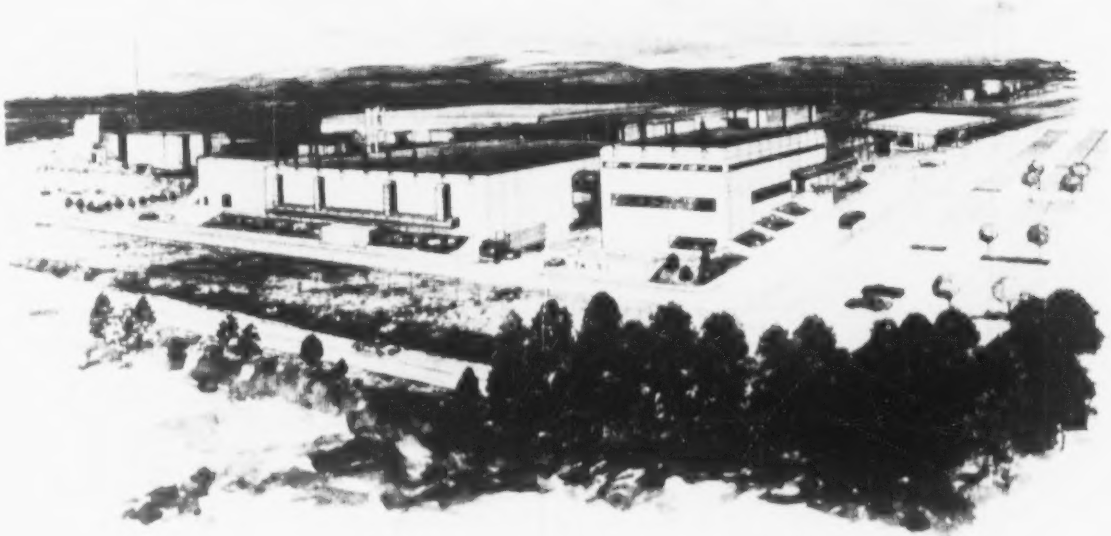
DP8062212

RD&T CONSTRUCTION

In the RD&T construction area, there are six new starts. Three are utilities or infrastructure support facilities at the labs and NTS; three and the remaining are programmatic projects.

[Slide follows:]

UNCLASSIFIED



SPECIAL NUCLEAR MATERIALS R&D LABORATORY REPLACEMENT

LOS ALAMOS NATIONAL LABORATORY

TA-55

LOS ALAMOS NEW MEXICO

UNCLASSIFIED

SNM LABORATORY REPLACEMENT

The largest ongoing project in the RD&T program is for the Special Nuclear Material Laboratory at Los Alamos. The project will replace the Chemistry and Metallurgy Research Building, which is over 35 years old. The project will also decontaminate and partially refurbish this building.

The project is not intended to, nor could it, provide plutonium production capacity capable of supplanting the Rocky Flats operation.

The project is needed to ensure reliable and safe research and development on plutonium processing. The project has recently been rescoped and revalidated to integrate plutonium R&D operations in a single secure location.

The project will also provide a waste pretreatment facility and enhanced security. The new cost estimate for the project is between $370 million and $410 million.

The project was begun in 1988. The fiscal year 1991 request is $20.6 million. Currently, we are preparing an Environmental Impact Statement, which is expected to be completed in spring 1991. The requested funding will support EIS preparation, and project design and management.

To complete the project, we must develop a funding strategy within expected budgetary restrictions.

[Slide follows:]

ROCKY FLATS PLANT OPERATIONS

Resumption of operations at the Rocky Flats plant is the highest weapons program priority. Plutonium operations were suspended for the semiannual nuclear materials inventory in early December. EG&G took over the responsibility for plant operation on January 1, 1990.

We have extended the suspension of operations to permit EG&G to install their own management team; gain a comprehensive understanding of plant operations; implement operational changes of formality and discipline, and make changes which will increase the margin of safety.

The schedule for phased resumption of plutonium operations is not final. We anticipate resumption of operations in the second quarter of this year, with full production in the third quarter. We will have a specific timetable in early April

ROCKY FLATS WASTE STORAGE

A troublesome aspect of the situation at the site concerns storage and disposition of transuranic waste mixed with hazardous components.

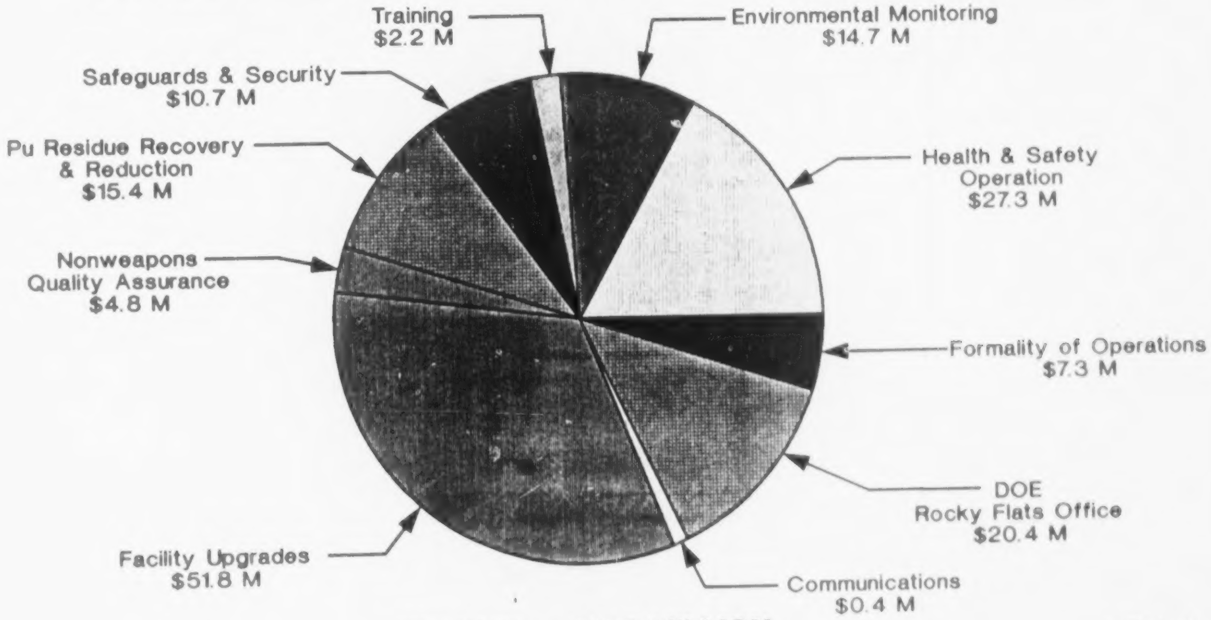
Our permit, granted by the State of Colorado, allows us to store not more than 1,601 cubic yards of this type of waste. Even during standby, waste is being generated, and it is being stored onsite. The onsite storage limit is projected to be reached about December 1990.

Since no permanent storage facility will be available until the Waste Isolation Pilot Plant comes on line, a supercompactor has been procured to reduce the volume of waste to be stored, and thereby provide temporary relief. I expect the supercompactor to be operational before the storage limit is reached. Supercompacting the waste will provide an additional one to two years before the 1,601-cubic-yard limit is again approached.

[Slide follows:]

DEFENSE PROGRAMS - WEAPONS ACTIVITIES

ROCKY FLATS OPERATIONAL IMPROVEMENTS



FY 1991 - $155 MILLION

DP8057002

ROCKY FLATS OPERATIONAL IMPROVEMENTS

The additional funding requested for Rocky Flats will support a wide range of activities needed for facility safety and operational upgrades.

The largest component, $51.8 million, is for facility upgrades for the site. These include utilities, upgraded sewer treatment, enhanced spill prevention for hazardous liquids, glovebox enhancements, and administrative and support facilities to house the augmented work force.

Another $15 million is requested for plutonium residue reduction and recovery, including a drum storage facility.

About $27 million is requested for health and safety of operations. This will provide programs and equipment to enhance dosimetry, decontamination, health physics support, industrial hygiene, radiation safety, and a facility to house environment, safety, and health laboratories.

The remainder of the initiative is made up of actions to respond to review and audit team findings. We are doing everything from replacing filters and valves to assuring that documentation is properly prepared—all of it to assure that we operate safely and effectively within the letter and spirit of applicable laws, regulations, and agreements.

In closing, I want to assure you that we are committed to maintaining the nuclear deterrent, a keystone of our national security. We are committed to safe and secure operations; safe for our employees and for the public. Finally, we are committed to maintaining a viable nuclear weapons complex to assure that we meet our Nation's needs today and modernize to meet tomorrow's needs as well.

I thank you for your support in the past, and seek your support for the funding request presented to you today. Mr. Chairman, I would be pleased to respond to any questions you or the committee members have, or to respond in writing, if you prefer.

[The prepared statement of Admiral Barr appears at the end of the hearing record.]

OVERSIGHT

Mr. Bevill. Mr. Secretary, the Department established many types of oversight of the weapons complex and programs. At this time, how many different groups and safety review boards are auditing or reviewing the production facilities and activities? How are you responding to all of the recommendations?

Mr. Tuck. Mr. Chairman, let break it down this way: We have what we term independent internal and independent external oversight. Independent internal oversight actions involve the Office of Nuclear Safety and the Office of the Assistant Secretary for Environment, Safety, and Health.

Independent external oversight, to me and to the Department, means the Advisory Committee on Nuclear Facility Safety, chaired by John Ahearne. Even though he reports directly to the Secretary, I view the actions of John Ahearne and his facility safety oversight function to be independent and external. The other external oversight group is the Defense Nuclear Facilities Safety Board, chaired by John Conway and established by statute last year.

As to how we are reacting to their recommendations, we have only had two sets of formal recommendations presented to the Department by the Defense Board. We have yet to respond publicly. We are in the process of doing that, first with regard to the status of training for the operators of the reactors at Savannah River.

I believe we have about another 30 days of the full 45 days that we are permitted to respond to the first set of formal recommendations from the Board. We anticipate being in a position to respond sooner than that.

Generally, with regard to Chairman John Ahearne's actions, we tend to be very responsive. When John Ahearne tells us he sees a problem, we have got to be responsive to it. We are doing so.

We have got a fair amount of both internal and external oversight to answer your question directly.

Mr. BEVILL. Would you put this in the record? How many people do you have engaged in oversight?

Mr. TUCK. Yes, sir.

Mr. BEVILL. And list each group and what their recommendations are and what your responses are when you make your responses.

Mr. TUCK. Yes, sir.

[The information follows:]

DEPARTMENT OF ENERGY NUCLEAR SAFETY OVERSIGHT GROUPS

The Defense Nuclear Facilities Safety Board consists of five members: John T. Conway, Chairman, A. J. Eggenberger, Vice Chairman, Edson C. Case, John W. Crawford, and Herbert J. C. Kouts. The Board currently is assisted by a staff of five. When the board is fully staffed up, it may have up to 100 full-time equivalents.

The Advisory Committee on Nuclear Facility Safety consists of the following members:

Dr. John F. Ahearne, Chairman
Mr. Phillip Bayne
Dr. Richard S. Denning
Dr. Jacob I. Fabrikant
Dr. William E. Kastenberg
Dr. Harold W. Lewis
Dr. James E. Martin
Dr. Dana A. Powers
Mr. Paul D. Rice
Dr. William J. Schull
Dr. Robert L. Seale
Dr. Gerald F. Tape
Ms. Victoria J. Tschinkel

The Committee will increase by one member, Mr. Jack Cleveland, within the next month. The Advisory Committee currently has a staff of ten (eight professional staff, two support staff) and hopes to hire additional staff to reach its authorized ceiling of 21 full-time equivalents within the next year.

The Director of the Office of Nuclear Safety is Steven M. Blush. This office was authorized by Secretary Watkins on September 28, 1989, and it is in the process of hiring a staff. There are currently ten staff onboard, with vacancy announcements for 18 more positions that have closed. There are 40 full-time equivalent positions allocated for the Office of Nuclear Safety in FY 1990 and FY 1991, respectively.

The Advisory Committee on Nuclear Facility Safety has forwarded to the Department 16 status reports some of which include recommendations. The Department has responded to some of the Advisory Committee recommendations, as indicated in the attached DOE responses. The Advisory Committee's other recommendations are under review.

The Defense Nuclear Facility Safety Board has forwarded to the Department three sets of recommendations. The Department is reviewing the recommendations and preparing its responses in accordance with the formal procedures set forth in Public Law 100-456; see attached Federal Register notices.

ADVISORY COMMITTEE ON NUCLEAR FACILITY SAFETY
RECOMMENDATIONS/RESPONSES

Date	Description
7/12/88	Letter Ahearne to Herrington re progress report of ACNFS.
8/15/88	Letter Ahearne to Herrington reporting on committee meeting at Savannah River Site on 6/15-17/88.
8/19/88	Letter Herrington to Ahearne responding to 7/12/88 Ahearne letter on safety criteria and their application to the New Production Reactor.
9/19/88	Letter Ahearne to Herrington reporting on meeting on 7/20-21/88 at Richland.
12/6/88	Letter Ahearne to Herrington reporting on committee meetings at DOE Headquarters on August 30-31 and at Idaho Falls on October 13, 1988.
12/14/88	Letter Ahearne to Herrington regarding restart of Savannah River reactors.
1/13/89	Letter Ahearne to Herrington providing comments on the draft DOE Safety Policy.
1/19/89	Letter Salgado to Ahearne re WIPP.
3/24/89	Letter Ahearne to Watkins providing an overview, history and status report on committee activities.
4/12/89	Letter Ahearne to Watkins responding to request as to what the role of the Advisory Committee should be after the Nuclear Safety Board is in business.
5/8/89	Request of Watkins to ACFNS to provide assessment of WIPP's safety and the identification of any potential safety concerns. (See 7/14/89 letter Ahearne to Watkins).
5/19/89	Letter Watkins to Ahearne requesting ACNFS to examine the potential response of HFBR to loss of coolant accidents and to provide independent recommendations on appropriate conditions for safe restart of Brookhaven National Laboratory.
6/7/89	Letter John F. Ahearne to Admiral Watkins re meeting at Brookhaven National Laboratory to evaluate safety aspects of the High Flux Beam Reactor (HFBR).
7/14/89	Letter Ahearne to Watkins re Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico.

7/28/89	Letter John F. Ahearne to Admiral Watkins re reorganization notice SEN-6-89 (1) to pass advisory responsibility for the large reactors to the Defense Nuclear Facilities Safety Board, (2) to remove nuclear safety oversight from the role of Environment, Safety & Health (EH), and (3) to restrict departmental oversight to line management. Committee believes that EH should remain in charge of independent, internal oversight, and that DNFSB as an independent board outside of DOE cannot perform that function.
9/7/89	Letter Watkins to Ahearne responding to Ahearn letter of 7/28/89 re independent internal oversight. Responds to ACNFS concerns about lack of internal oversight function under new reorganization plan.
9/28/89	Letter Ahearne to Watkins in response to Watkins' 9/7/89 letter re nuclear safety oversight reorganization.
10/20/89	Letter Watkins to Ahearne re airborne effluent containment systems at Pantex.
10/25/89	Letter Ahearne to Watkins reporting on committee's September 6-7 meeting at the Savannah River Site.
11/9/89	Letter Watkins to Ahearne responding to committee's 10/25 letter re SRS.
11/30/89	Letter John F. Ahearne to Admiral Watkins reporting on 10/11-12/89 meeting in Colorado (Rocky Flats).
12/5/89	Letter Watkins to Ahearne in response to 11/30/89 Ahearne letter re Rocky Flats.
12/11/89	Letter Ahearne to Watkins re review of Waste Isolation Pilot Plant (WIPP) project.
12/15/89	Letter John F. Ahearne to Admiral Watkins re committee meeting on 11/13-14 in Amarillo, Texas, re Pantex.
1/22/90	Letter Watkins to Ahearne in response to 7/14/89 Ahearne letter re WIPP, HFBR and ATR.
1/29/90	Letter Ahearne to Watkins following up 11/30/89 letter on Rocky Flats. Discusses concerns about designation of authority and responsibility during an emergency.
2/12/90	Letter Watkins to Ahearne re ACNFS report on Pantex.

TRITIUM SUPPLY

Mr. **Bevill**. Last year, the Department testified that the lack of tritium production would become critical if the reactors were not started by December 1989. The reactors have not started. Now the critical dates have changed.

What has been done to accommodate that slip in production capabilities?

Mr. **Tuck**. A couple of things have occurred. The Department of Defense has reduced their demand for tritium. In addition, there have been significant economies, with regard to our internal management of tritium as it moves around in the system, both from weapons back to the Savannah River Site and out again. A combination of those factors—economies affected by a very tight, close group on the part of Military Application and Nuclear Materials and retirements that earlier were alluded to, has made the world change so that we are not in the situation we told you we would be in by last Christmas.

We now have adequate tritium to keep the viable, [deleted] weapons retirements and economies affected internal to the system.

SAVANNAH RIVER REACTORS RESTART

Dr. **Barker**. I would only add the point, Mr. Chairman, that these are one-time savings because the Department of Energy improved the efficiency of its operation. There is no cushion left, if there should be continued extension of the outage of Savannah River.

We asked the services to examine their stockpiles. Whether or not this was a causative factor, I can't say. We did have retirements that occurred in this timeframe which have enabled us to sustain ourselves during a difficult period.

Mr. **Bevill**. The circumstances have changed?

Dr. **Barker**. The circumstances have changed. I don't think we can count on a similar beneficial change to enable us to get through [deleted].

So, we view the restart of Savannah River as a very, very important event.

Mr. **Tuck**. We don't want to diminish that point in the slightest. We view the production of tritium at the reactors at Savannah River as the only option and course of action that is viable.

There is no other alternative available to us other than the restart of these reactors at Savannah River to produce tritium, hopefully, at the beginning of 1991. There is no other fallback position we could recommend to this committee to produce the required tritium we would require to keep our nuclear deterrent viable.

Mr. **Beville**. Did you have some comments, Admiral?

Admiral **Barr**. No, sir.

Mr. **Bevill**. All right. The Chair recognizes Mr. Myers.

Mr. **Myers**. Thank you, Mr. Chairman.

Mr. Secretary, John is an old pro here on the Hill from way back. This is his first appearance before this committee, though. We welcome you aboard.

Mr. **Tuck**. Thank you, sir.

STOCKPILE YIELDS

Mr. **Myers**. Admiral, this is your first appearance also. You have some associates there who will show you where the rocks are before we throw them at you.

Dr. Barker, you spoke about the reduction in the yields that we have in our inventory. I have been reading some of the press accounts which say we are building weapon after weapon, that we have more weapons than we will ever need. I hope that is true.

According to what you are telling us here, in the last few years we have reduced our inventory by a factor of five. How do we compensate for that loss of inventory and yield capacity?

Dr. Barker. [Deleted.] That, of course, has been the result of our ability to field smaller, lighter, more efficient weapons.

It has been a direct result of the work of the Department of Energy. The fact that that yield reduction was possible in conjunction with improvements in accuracy is what has enabled us to reduce the total yield without compromising nuclear deterrence at all.

The issue of the shrinking of the stockpile without benefit of negotiated bilateral reductions may be an issue of greater concern. In each case, the services have been given an opportunity to evaluate their ability to fulfill their mission.

For instance, the Navy determined that with modern accuracies, modern target and acquisition capabilities, they are able to fulfill most of their anti-submarine warfare functions with conventional weapons and, therefore, don't need the nuclear weapons that they have had in their inventory for the past 20 years.

[Deleted.]

Mr. **Myers**. Your response is what I feared. The tradeoff has been when we reduce our nuclear capability, we have gone to conventional. We know if we trade off nuclear, that conventional will be a lot more expensive. In a time when we are living with constraints on expenditures, we are not able to keep up if we are going to have to go to conventional.

As I recall, many, many years ago, I went to nuclear war school just when it was a new concept. We learned back then, if you trade off yield, you have to increase the CEP. That is what you are telling me. You are improving in accuracy.

How about the total numbers of weapons we have available to deliver?

STOCKPILE SIZE

Dr. **Barker**. [Deleted.]

Mr. **Myers**. The accuracy on our CEP has been improved?

Dr. **Barker**. Significantly, yes.

Mr. **Myers**. The Nuclear Weapons Stockpile Memorandum that you are talking about, we have slipped, haven't we, in the last couple years? Do we see light at the end of the tunnel? [Deleted.]

Dr. **Barker**. We have had to do hard thinking about the stockpile capability.

Mr. **Myers**. It seems like the Stockpile Memorandum is just according to inventory.

DOD/DOE NWSM DEVELOPMENT PROCESS

Dr. **Barker**. I think that is exactly the impression. The point I want to make here is that in some people's minds we have left the impression that the Stockpile Memorandum is always a requirement document. In point of fact, we go to the Commanders-in-Chief at various theaters and ask them what their requirements are.

The Joint Chiefs of Staff then reviews those requirements, takes a look at their view of fiscal reality, and modifies the requirements that come in from the Commanders-in-Chief. Then we sit down with the Department of Energy and say, "Here is what we would like you to deliver." They may respond with "Rocky Flats is shut down, we can't possibly deliver that many weapons in this year." We then say, "How many can you deliver?"

Finally, we try to prioritize our requirements within that reduced total. The Stockpile Memorandum always represents the prioritized requirement, but the ceiling is not, does not reflect the requirements of the CINCs. It corresponds to the current fiscal realities, and, in this case, ES&H realities.

As soon as Rocky Flats is back in operation we are going to have to try to recover the lost production consistent with fiscal realities as the President of the United States sees it, and as this committee sees it.

ROCKY FLATS RESUMPTION

Mr. **Myers**. Do we have a timeframe when we expect Rocky Flats to get back on line?

Admiral **Barr**. We expect to begin to come back the second quarter of this year, and should be back to full production——

Mr. **Myers**. About the third quarter full production? Are we on schedule?

Admiral **Barr**. Now we are, sir. I expect that in April we will have a more solid schedule, better than just by quarter. I should point out that there are a lot of things that could cause us to fall off that schedule should the Advisory Committee and the Defense Nuclear Facilities Safety Board which Mr. Tuck mentioned, make recommendations for unanticipated improvements which we must deal with—that could be a problem.

We might be confronted with legal challenges claiming that the resumption of operations is a significant Federal action and therefore require preparation of Environmental Impact Statements. There are a number of uncertainties. Our best current estimate is full production in the third quarter.

STOCKPILE MODERNIZATION

Mr. **Myers**. There have been a number of disruptions in modernizing the inventory. Are we at the point where we have weapons in the inventory that might be coming to the unsafe period?

Dr. **Barker**. We annually reevaluate the stockpile.

Mr. **Myers**. We could get into real trouble.

Dr. **Barker**. I think both Secretaries would admit to some discomfort over the way in which we have slowed down the rate of introducing bombs with the most modern of safety and security features into the stockpile. That is why I said a moment ago, as soon as Rocky Flats is back up and operating, I think we would like to see the recovery of those weapons schedules that we had before the shutdown.

Mr. Myers, I don't want to leave you with the impression that I believe there are unsafe weapons in the current inventory. But I do believe there are weapons that could be a lot safer, that could replace some of those older ones in the inventory.

Mr. **Myers**. The new weapons you are building are going to be safer. The ones we have in inventory are aging now. In our inventory, are we keeping up with what we expected to replace? Are we delaying replacement because we are not willing to put the money out?

Dr. **Barker**. There are two elements contained in your question. The first has to do with the fact that we do have decay of tritium in the bottles in the stockpile. Unless those bottles are replaced, we lose yield.

I will turn to Admiral Barr to help me on this one, but I don't think we know of any weapon in the stockpile whose safety is degrading because of chemical changes that we see occuring because of age.

There are weapons that have been in the inventory for 30 years that were built with the best safety features known at that time. Thirty years later, we know how to do the job a lot better, and we would very much like to replace those 30-year-old bombs with more modern bombs.

Let me emphasize again, I don't know of any case where chemical deterioration in the stockpile is viewed as reducing the safety of weapons already there.

Mr. **Myers**. Did you have something?

Admiral **Barr**. We do have an ongoing stockpile evaluation program to look for just those kinds of things. If something like that was happening, I think we would find it.

Mr. **Myers**. What concerns me is the fact that we all recognize we are having to reduce the amount of money we have available for many, many programs. It seems when you say we are not replacing, or at least there have been some disruptions in the replacement, there is some risk that we might be keeping some unsafe weapons in the system. These will have to be replaced some time.

They may be more difficult to handle if they get beyond that safety point. I notice in most of the viewgraphs that you have, we have cut back a number of programs. Safety and safeguards have not been one of them, except one or two exceptions where you cut back. That indicates you still have a concern.

Nevertheless, you do have some of those weapons in inventory. You have a big job. I know the world opinion on it today, and some Congressional opinion, is we don't need nuclear weapons. I think that is the last place maybe we ought to cut. It doesn't seem to be a popular one. I hope we don't wake up too late.

Thank you for the job you are doing.

Dr. **Barker**. I appreciate your support.

Mr. **Bevill**. The Chair recognizes Mrs. Boggs.

FEDERAL EMPLOYMENT EXEMPTIONS

Mrs. Boggs. Thank you, Mr. Chairman.

Secretary Tuck, it is nice to have you back where you belong. I was interested in one of the items that we have dealt with in various committees this year, where you say that the recent increase in Federal pay will provide some relief in acquiring the personnel with the sorely needed technical skills to manage the Department's defense programs. We have run into that problem over and over and over again.

But, you are saying you still need Congressional support for some personnel actions. Is that asking somebody who retired to come back into service without jeopardizing their existing financial benefits? Could you elaborate on that?

Mr. Tuck. Thank you for raising that point. I think it needs to be underscored at every opportunity. I very much appreciate this opportunity.

Last year, we were successful on the Senate side to receive supermajority support for two concepts with regard to the pay question in terms of tracking the kind of talent we think we require to do the job in the Department of Energy.

One concept was identifying 25 critical positions where we could pay them 150 percent of Executive Level 4 pay, which would be capped not to exceed about $135,000 a year, annualized salary level, and to get the Senate to pass and send to the House the concept of waiving the prohibition on double-dipping—talent retired from the military. The Naval reactor program was the one I specifically had in mind.

We could attract those nuclear-trained individuals with skills akin to those acquired by Admiral Barr over the course of his career, to come back and work for the Department of Energy to effect the kind of oversight we think we need of contractors who do most of the work for us at the weapons complexes around the country.

We could not attract those people absent this kind of a proposal, because they would lose if they came back on the government payroll, they would lose their retirement benefits. They would be capped at not to exceed the Executive Level 4 salary level in the pay system.

We were looking for an opportunity to see if we could, on a limited basis, be able to attract nuclear-trained individuals with very important skills to be able to retain their retirement pay, as well as get a full government salary for their service.

We have not made this clear, but it is important for people to understand that the Department of Energy is really only about 17,000 individuals. In the weapons complex business it is less than 4,000 individuals.

We oversee contractors that are hired by the Department of Energy to produce a product. We have less than 100 individuals right now at Rockv Flats overseeing in excess of 5,000 contract employees.

We were seeking to try to attract the very best talent we could find to effect that oversight, to make sure these contractors would pay attention to the priorities with regard to environment, safety, and health concerns and to make sure the Department of Energy is getting its right return for the amount of money being paid to them.

The thought was, and the thought still is that we would like to have that kind of relief to be able to attract that kind of talent to the Department of Energy.

What I am specifically alluding to is there has traditionally been a linkage between what is paid an SES-6 and an Executive Level 4 individual. As we know, because of the actions of Congress last year and assuming no action to the contrary this year, there will be a pay adjustment for Executive Level 4 individuals. Therefore, the salary rate will go up for SES-6 individuals and the lower levels. We hope that will be a means of attracting more talent to the problem we need to address in the Department of Energy.

This is not just our initiative. The issue right now is DOE is trying to find people with these talents; while the contractors we are overseeing, are seeking these same individuals.

They are in a better position to pay these salaries than we are with caps on certain types of government employees. Similarly, there is a plethora of oversight activities.

The Defense Nuclear Facilities Safety Board is after this talent pool also. Other parts of the Department are seeking people in this talent pool. Pretty soon they are going to get smart. They will figure out they can trade these skills for whatever dollar they can bring. We are trying to attract talent to work with us through better pay arrangement.

Those are the two means we have in mind.

TIGER TEAMS

Mrs. BOGGS. Thank you very much. I also wish you would sort of flush out for me the types of individuals, the categories of talents that make up your tiger teams.

Mr. TUCK. The makeup of the tiger teams has evolved over the course of the last nine months. Something akin to a tiger team was brought to bear on the situation at Rocky Flats that occurred last June. There it was an effort on the part of Admiral Watkins to establish what he termed at the time ground truth with regard to the status of his complex and specifically with regard to the situation at Rocky Flats.

A host of talents from across the broad spectrum, primarily environment, safety and health, individuals from the field were brought to the Rocky Flats site.

After that initial experience, the concept of tiger teams, first enunciated in the latter part of June, was made more specific.

Today we still go across a broad spectrum of talents in the Department. We have these tiger teams primarily run from the Office of Environment, Safety, and Health. It is an aggregation of talents in those areas augmented more recently by talent from the Department of Labor because we have added OSHA standards to be compiled with as a part of these tiger team investigations.

Basically that is the makeup of the tiger teams.

ACCESS BY STATES TO DOE FACILITIES

Mrs. **Boggs**. The other thing I would like to have embellished a little bit, please, is how you work in collaboration with the State officials monitoring environment, safety and health compliance by providing access to defense nuclear facilities.

Mr. **Tuck**. I think Admiral Barr can amplify more specifically with regard to Colorado because it works there better than anywhere. We have worked closely with the Colorado Health Department, and have also worked closely with regard to the Washington State crowd.

We have worked closely with the Governor's office in the State of Colorado generally on the subject of Rocky Flats and ensured that their people were permitted access to our facilities.

They initially didn't have clearance. We made sure that happened. We made access more easily for the Colorado health individuals to Rocky Flats; therefore they are invited to work right along side of our environment, safety, and health oversight individuals to ensure that the line is operated in a proper fashion.

Admiral Barr?

ACCESS TO ROCKY FLATS

Admiral **Barr**. Just a few more things, Ma'am. There is onsite at Rocky Flats a permanent Colorado Department of Health representative. He basically has access to any place he wants to go. He comes in and attends meetings. He is only limited by his ability to get places to determine what is going on. We also fund a good portion of those activities for the state. It is not from the state coffers. They have a right, which they exercise, to take samples before we do various types of discharges.

We try to be as completely open and cooperative as we possibly can be, I think, because that is the way we can best convince people that there is no problem—if there isn't one. Otherwise, you get into the problem of, "You didn't tell us, so how do we know?"

That is the general way that we are proceeding—with that degree of openness—we are trying to work in concert with the states and, in some cases, the local people as well.

Mrs. **Boggs**. That is probably very efficacious in your dealings with the State and having them satisfied that what you are doing is correct.

Admiral **Barr**. Yes, Ma'am.

TECHNOLOGY TRANSFER

Mrs. **Boggs**. The other very positive note in your testimony was the support of the transfer of technology to the private sector. Can we have that spelled out a little bit for us?

Mr. **Tuck**. I would like to respond, if I may, a little bit more on the record. Admiral Watkins made it clear there is technology that can be properly transferred to the private sector that we derive as we go through this exercise.

He wants to be supportive of that. He just hosted a hearing up here on last Friday in that regard. But, that is really all I have. If you permit, I would like to be a little more responsive on the record.

Mrs. BOGGS. That would be very welcome. Thank you.

[The information follows:]

TECHNOLOGY TRANSFER

Technology transfer is a priority matter for the Department of Energy (DOE). In the Secretary of Energy's notice on "Setting the New DOE Course," Admiral Watkins stated that the DOE national laboratories are tasked to place new emphasis on technology transfer. A Headquarters Technology Project Group has been established under the Office of Policy, Planning, and Analysis to develop a Departmental strategy for implementation of the provisions of the recently enacted National Competitiveness Transfer Act. A field task force has been established to provide options and recommendations to the Technology Project Group regarding policy and procedures.

In June 1989, the Assistant Secretary for Defense Programs approved a charter supporting the transfer of Defense Programs (DP) technology to U.S. industry. The enactment of the National Competitiveness Technology Transfer Act of 1989 amended section 91 of the Atomic Energy Act to emphasize technology transfer as a mission of DP. Responding to this impetus, DP's Technology Management Branch initiated an approach, in concert with other affected DOE elements and under the central coordination of the Office of Policy, Planning, and Analysis, to develop a Departmental strategy for implementing the 1989 legislation.

In FY 1990, initial technology transfer guidelines have been developed and issued. In addition, three pilot projects with industry have been initiated. One such project will work with an industry consortium to apply specialty metals technology to commercial uses. The second is working with a group of industries in the transfer of advanced manufacturing techniques. The third technology involves the development of a proliferation-resistant technology for the production of tritium light sources that could be used in expanded commercial and military activities. Continuing DP activities in these areas for FY 1990 will include contributions of individuals and knowledge toward the formulation of DOE-wide policy and procedure development through the legislative implementation task force established by Deputy Secretary H. Moore on January 31, 1990.

In FY 1991, we will continue to develop policy groundwork for implementing technology transfer in DP and to develop cooperative agreements between the laboratories and U.S. industry. There will be a significant effort to evaluate project proposals (over 40 have been received already), as well as to implement and monitor existing and new projects. In addition, we will continue the specialty metals processing consortium and the advanced manufacturing technology initiative; assist in promoting a proliferation-resistant tritium light source manufacturing technology; and plan to establish about six more technology transfer projects.

Some examples of new proposals are: industrial applications of copper lasers; ultra precision diamond machining; combustion synthesis of advanced ceramics; package testing certification and design center; and robotic science and technology center.

FOLLOW-ON TO LANCE MISSILE

Mrs. **Boggs**. Given changes in the situation in the core zone of Europe, is a vigorous program to develop a new warhead for the Follow-on to LANCE necessary?

Dr. **Barker**. At this stage, Mrs. Boggs, the answer is very definitely, yes. A year ago the heads of NATO governments made a decision to deploy Follow-on to LANCE in 1992.

Several months ago, Foreign Minister Genscher reminded the U.S. press of that decision. More to the point, I think, is the fact that the decision to do the research and development and to produce a Follow-on to LANCE is an American decision.

America needs to decide whether it believes its ability to deter nuclear conflict on a worldwide basis would be enhanced by having a Follow-on to LANCE weapon in its inventory. A NATO decision on the deployment of Follow-on to LANCE is interesting, but in my view, is certainly not definitive as to whether or not the U.S. inventories should include a Follow-on to LANCE.

The factors that need to be considered are not currently, thoroughly understood. A continuation of the research program that is in the President's budget in the fiscal year 1991 both in the DOE and DOD's research and development budget is a prudent step to take until we better understand the situation. A year from now I would be very happy to be asked the question again and, hopefully, we will be somewhat wiser by then and I give you a more definitive answer.

Under the current circumstances, I think approval of the President's budget for a Follow-on to LANCE in both DOE and DOD is very proper under these circumstances.

Mrs. **Boggs**. What is the estimated cost?

Dr. **Barker**. [Deleted.]

Admiral **Barr**. We need to get back for the record our total anticipated R&D budget.

[The information follows:]

Follow-on to Lance R&D Costs

It should be noted that SRAM T and FOTL use a common warhead. Therefore, a cost breakout of FOTL R&D costs is not possible. Furthermore, since the Follow-on-to-Lance warhead is still in Phase 2A, a baseline cost estimate for research and development has not been completed. However, preliminary estimates indicate that the research and development costs for the common warhead will be approximately $209 million.

SDI NDEW

Mrs. **Boggs**. Thank you.

What is the budget request for DOE support of the Strategic Defense Initiative? How does this compare to the level of actual appropriations over the past several years? What are the projected budgets for the next three years? What is the budget request for DOE support of SDI?

Admiral **Barr**. I should start by saying, Ma'am, that people talk about DOE's NDEW program and think of it in the SDI category. I would like to clarify that NDEW is primarily nuclear threat assessment. We need that program as part of our RD&T core to look at the nuclear directed energy weapon potential for a threat to our own defensive or strategic deterrent posture.

We do have a large amount of money which comes to DOE from the SDI organization and the DOD. It is what is called the "work for others" category. We exp~~ect that~~ in 1991 it will be about $370 million; in 1990, it is about $350 million. That is split between money which comes directly to DOE from the SDI office, and a fair amount of money which comes from the SDI office through other offices, primarily the Army Strategic Defense Command; and then goes on to the laboratories.

The total is about $370 million. There are a number of things we do in that. The three principal ones are Brilliant Pebble, the Free Electron Laser, and the Nuclear Particle Beam. There are a number of other less costly things we do under their aegis.

I could provide more for the record if you would like me.

[The information follows:]

DEPARTMENT OF ENERGY (DOE) REIMBURSABLE WORK FOR THE STRATEGIC DEFENSE INITIATIVE ORGANIZATION (SDIO)

The following descriptions are provided for major reimbursable programs being conducted by the DOE national laboratories with funding from SDIO :

A. Brilliant Pebbles is a concept developed at the Lawrence Livermore National Laboratory (LLNL) for a highly proliferated, space-based kinetic kill weapon. The concept definition phase begins during Fiscal Year 1990 with component testing scheduled. DOE Headquarters is expected to directly receive $75 million from SDIO in FY 1990 for research and development at LLNL. An additional $15 million will be provided from SDIO for flight testing.

B. The Neutral Particle Beam program is a research effort to produce beams of electrically uncharged subatomic particles. When these beams are boosted to high energies in a particle accelerator and focused, they can travel large distances through the vacuum of space without being deflected by the Earth's magnetic field. A neutral particle beam weapon concept consists of an accelerator platform that can generate, accelerate, and focus a lethal beam of neutral particles at distant targets in space. This program at the Los Alamos National Laboratory (LANL) will receive approximately $64.5 million from SDIO during FY 1990.

C. The Ground-Based Free Electron Laser program is a research effort investigating high-power lasers that use an amplifying medium that consists of a high-energy electron beam in a varying magnetic field. The free electron laser can be operated in a broad wavelength and is theoretically capable of producing enormous power and would be used in terminal defense. This program is expected to receive $17.5 million in FY 1990 for research at LANL.

D. Advanced Sensor Technology includes efforts at several DOE laboratories to design fabricate and test novel infrared detectors and cryocoolers for surveillance sensors and interceptors. Expected SDIO funding during FY 1990 is $1.4 million.

E. On the Chemical Laser program, LLNL is investigating surfacing techniques for large resonator mirrors required for a laser weapon system. SDIO funding for this effort at LLNL is expected to be $2.5 million in FY 1990.

F. The Nuclear Directed Energy efforts at LANL, LLNL, and Idaho National Engineering Laboratory (INEL) receive some SDIO funding to support concept systems evaluations, diagnostic work, propagation issues, and demonstration of technologies. Expected SDIO FY 1990 funding is LLNL--$7.3 million, LANL--$2.8 million, and INEL--$0.9 million.

G. The Command and Control activities conducted by LANL and Argonne National Laboratory (ANL) involve investigation of parallel data processing, man-machine interface, network analysis interface, network analysis, processor hardware, algorithm evaluation, and parallel simulation techniques that could be applied to SDIO needs. Expected funding in FY 1990 is LANL--$0.9 million and Argonne National Laboratory (ANL)--$0.5 million.

H. A Manufacturing Operations Development and Integration Laboratory at the Oak Ridge National Laboratory (ORNL) is investigating manufacturing technologies that will allow production of affordable, survivable optical components to be shifted to private industry through technology transfer. This effort is funded at $6.65 million by SDIO in FY 1990.

I. In the Countermeasures area Sandia National Laboratories (SNL) is investigating, fabricating, and testing critical countermeasures to the SDI architectures. Expected funding by SDIO for this work in FY 1990 is $4.37 million.

J. The Strategic Defense Facility is being completed at SNL in Albuquerque, New Mexico, to provide a research and testing laboratory for SDI programs requiring pulsed-power technology. This construction project will receive $7.0 million from SDIO in FY 1990. Funds for this facility have been shared by SDIO and DOE by Congressional guidance.

K. The Phase One Engineering Team activities at LANL, LLNL, and SNL are investigating issues that could affect deployment of the Strategic Defense System. These laboratory teams perform selected, high-priority technical studies and conduct system assessments, analyses, and cost studies. The FY 1990 funding from SDIO is SNL--$1.3 million, LANL--$0.7 million, and LLNL--$0.5 million.

L. The Space Power activities sponsored by SDIO include efforts to develop a compact space reactor power system (SP-100) and investigation of nuclear and nonnuclear power generator schemes in the multimegawatt regime. This effort is jointly funded by DOE, the National Aeronautics and Space Administration (NASA), and SDIO. The SDIO funding is expected to be $27.17 million in FY 1990.

The remaining DOE effort expected to be about $130 million consists of approximately 75 smaller efforts conducted to support SDIO executing agents (i.e., Department of the Army, Department of the Navy, and Department of the Air Force) on tasks that they are conducting. Specific details of these programs would have to be provided by SDIO.

Mrs. **Boggs**. Thank you very much.

Do you have projected budgets for the next three years?

Admiral **Barr**. We will have to get that for the record.

[The information follows:]

DOE Nuclear Directed Energy Research Funding

It should be clarified that the Nuclear Directed Energy Weapons research is an integral part of the DOE's weapons technology base and a primary DOE mission for nuclear threat assessment, both for current strategic forces and for future U.S. Defensive architectures.

The projected costs for the NDEW effort for the next three years are:

	Millions
FY 1991	$191.9
FY 1992	$199.6
FY 1993	$207.0

Previous funding related to NDEW from FY 1987 to FY 1990 is as follows:

	Millions
FY 1987	$349.0
FY 1988	$279.0
FY 1989	$240.3
FY 1990	$179.2

Mrs. **Boggs**. Thank you very much.

I have some other questions for the record, but I have used a great deal of time. Thank you, Mr. Chairman.

Mr. **Bevill**. The Chair recognizes Mr. Fazio.

Mr. Fazio. Thank you, Mr. Chairman.

John, I would like to welcome you here and give you some of the credit for putting us in position to have that pay raise in January. I don't know if this is something you want to get outside of the room, but you were always one of the biggest backers we had in the White House, and we appreciate it.

Mr. **Tuck**. The President is the backer.

Mr. **Fazio**. I guess so, but we appreciate your role in helping him. I particularly want to congratulate you on making the transition from staff to line. That doesn't happen too often in a career. I am pleased whenever it happens. It is good to see people who are essentially politicians proving they can do things other than get people elected to office.

Admiral, nice to see you and Dr. Barker once again. How many years have we had the pleasure of meeting you?

Dr. Barker. I think this is the third year. It is difficult to distinguish me from my predecessors.

OVERSIGHT

Mr. **Fazio**. There has been a line of consistency.

I guess in response to the questions asked earlier about tritium, it kind of rang a bell with me because I have a tendency to believe the Department every year.

I guess maybe that is the problem the Congress found itself in with the Department of Energy. I have to say, and I certainly don't imply that I mean this to apply to anyone but me, but I don't believe we do a very good job of oversight over the Department's military weapons program.

I guess the media thinks Congress in general doesn't. I think if you were to ask them where we have fouled up in the last 10, 15, 20 years, they would say the savings and loan crisis. And, they would be right.

Then they would say the Department of Energy's nuclear weapons program, and I think they would be right. I am kind of interested in anybody's response here. How do you think we could do a better job of oversight over the Department? How could we be less culpable than we obviously are for the kinds of problems that have occurred at the Department in the last umpteen years? You can go back as far as you want to go.

How could Congress be less responsible along with a lot of other people, including many of the people in this room, many of them who preceded you, for the kind of problems that we face that Admiral Watkins is obviously doing his best to try to get a handle on?

We ought to be honest. We are all in a private room here. Nobody can hear us. We can't hear anybody else. How do we keep on with the same kind of system that we use year after year when we have had these kinds of breakdowns and failures that are so chronicled?

Mr. TUCK. I think, Mr. Fazio, I think there are a lot of things that play here. Let me give you a couple of observations.

This Department is relatively new. In fact, the fathers and mothers of this Department are still serving in Congress. Many committees of Congress since the inception of this Department still take great pride in their fatherhood.

In fact, I would say that if we counted up, after the Department of Defense, this particular Department and its far-flung activities and operations probably has more congressional oversight than any other entity of government in terms of the number of times that they are asked or brought before important committees of Congress to make known or make a position.

Mr. FAZIO. Is that in a very recent timeframe?

Mr. TUCK. That is 1988 in terms of the numbers. I think there were 250 odd command performances for some entity of the Department of Energy to come before the House and Senate in 1988.

I think it may have rated a little less than that in 1989. I think about 230.

Mr. FAZIO. Could you for the record break out which of those are related to weapons program?

Mr. TUCK. Yes, I will.

[The information follows:]

DEPARTMENTAL APPEARANCES BEFORE CONGRESSIONAL COMMITTEES

	FY 1988 hearings	FY 1989 hearings
Defense programs	26	47
Naval reactors	3	2
Other DOE	89	99
Total	118	148

OVERSIGHT

Mr. Tuck. The first observation is that there are a lot of people who the Department feels it has to be responsive to, not only the terribly important Appropriations Committee and the most important Energy and Water Appropriations Subcommittee, but there are a lot of people sending signals that their view should be the priority responded to by the Department.

Mr. Fazio. Obviously, there are diverging views.

Mr. Tuck. The Armed Services might be disposed to recommend that the dollars be skewed for production. Environmental restoration takes second fiddle or second place. Others on the Energy Committee, and some of the Environmental Committees, might suggest that the monies be skewed in other directions.

Another thing that has happened in the last 12 or 13 years in the history of the Department is that statutes which were not applicable at one time to the Department, environmental statutes specifically, over time were made applicable. So the rules changed with regard to what the priorities were of the country because the Congress reflects what the will of the respective constituencies that make up the Congress want.

The Congress has been pressured and has probably seen that the way the Department of Energy was conducting business was probably not in the best interest of its respective constituencies. That is to say, over time they came to realize that statutes that were originally not applicable to the Department of Energy were made applicable because as Congress got into it, they found out there were scary things going on. The point is that the rules changed over time.

Another factor is that over the last 15 years the country as a whole has become much more concerned about the environment. It has decided that it is necessary for the Federal Government to play a role that it has not always played as relates just to the Weapons Complex and that the same standard ought to be made applicable to all aspects of the nuclear agenda as were made applicable after the Three Mile Island incident in 1979.

So, the standards became more stringent. How could actions on the part of the Congress impact what we should do from here on out?

Mr. Fazio. I am specifically thinking about this subcommittee. I think the record shows we fund almost every dime you ask us to fund in the defense-related DOE functions. Nobody has ever sat there and said before it becomes known to the public and the newspaper, "Hey, Rocky Flats is falling apart."

Mr. Tuck. We should do a better job in helping you deal with these oversight functions you have to perform. We should stay closer in touch with your staff to apprise you of those actions.

Rocky Flats was a surprise for those of us who are new on watch at the Department of Energy. I never heard of Rocky Flats before March 1, 1989. On the first of June we were apprised that an EPA FBI storm trooper force of 70 some odd individuals were going to invade it because they were concerned——

Mr. Fazio. Without a Q clearance.

Mr. Tuck. About alleged activities that were going on there.

OVERSIGHT

Mr. **Fazio**. In other words, you are telling me, John, that you don't think the Department leadership was apprised of what was happening in many of its own facilities. Is that right?

Mr. **Tuck**. I think that, frankly——

Mr. **Fazio**. They weren't really lying to us? They didn't know better?

Mr. **Tuck**. I think what Admiral Watkins has done over the last year is one thing. That is to arrange it so somebody could be available for whatever set of circumstances. I think before Admiral Watkins got there, the way the thing was structured, that is to say with heavy emphasis on policy only being promulgated at headquarters with little or minimal followup and the field being left to do whatever it had to do just so long as the production numbers came out right at the end of the year was generally the way things were done.

I think while that may have produced the required Defense Department requirements adequately over the course of the last ten years, it was done at a significant cost that I don't think all of us at Headquarters were apprised of until this tiger team concept was brought into place when Admiral Watkins came on board.

The whole exercise was to be able on the part of Admiral Watkins to get his arm around a series of issues that should be controlled at headquarters and have headquarters be apprised of what the problems are so that the Secretary can make a proper recommendation to the Congress about how we ought to prioritize our request for resources to address these problems.

That is now beginning to be done. I think this fiscal year 1991 budget does reflect that somebody is in charge who is technically competent and organizationally proven at the Department of Energy to be able to rack and stack this thing so that it makes some sense, more so than the previous year's submissions.

CONTRACTOR EMPLOYMENT

Mr. **Fazio**. Let me follow up on the number of contract personnel versus those on the payroll. Senator Pryor, every year, gets an amendment in—we usually deal with it in conference—providing a limitation on the number of contract personnel. People tell me DOE would fall apart if we ever agreed to it.

Mr. **Tuck**. That is the truth.

Mr. **Fazio**. Senators Johnston and Hatfield always seemed willing to recede. I sense Senator Pryor is gaining more strength with his attack on contracting. Would you want to comment on that issue? First of all, can you give me a comparison?

Mr. **Tuck**. The important thing to remember is the Department of Energy doesn't produce anything. It hires somebody to produce every component or sub-component that goes into a nuclear weapon. It is not produced by a government employee. The government employee simply oversees the production of that widget or element or sub-component or whatever.

The system is structured, I think, basically, as it has been from the beginning, because the private sector is the place where the talent existed to be able to do this very specialized work.

From the days of the Manhattan project, they didn't turn to government employees. They turned to DuPont or AT&T, or wherever the brains were aggregated at that time in the country's history.

We started from a civilian sector. The Department of Energy and its predecessor agencies started with that approach to things. So, ever since we have been in the nuclear weapons business, we have asked the private sector to do it for us.

We have tried to provide the kind of oversight—and the Appropriations Committee the underpinning legislation—to make sure that whole thing held together.

I don't think that is going to change tomorrow. There are certainly not, to my knowledge, the talents available in the government to be able to do the kind of things that have to be done in terms of this extraordinarily technical and demanding set of skills to assemble nuclear weapons.

We have to rely very heavily on other entities created by the Atomic Energy Act—for example, the laboratories—to provide the intellectual underpinning of the nuclear deterrent. We always look outside of government for that.

I think we will always have to. There are lots of reasons, one of which is pay, but others other than pay come to bear. The government is not in the university business. Universities are where you put laboratories so you can have this critical mass of competent thinking people who can share views with one another and make a finding, a new approach to things. There has to be a special arrangement there.

That is certainly just looking at it historically. I, on the other hand, don't think we need contractor employees in the business of telling us how to manage. I think the Department of Energy ought to be managed by the people who are put there and confirmed by the Senate, and are the President's team to manage the operations of that Department.

If they are found wanting by the higher levels of management, they ought to be gotten rid of and new people brought in. I don't think we ought to have a lot of people in the Department of Energy doing things which we are sometimes accused of by Senator Pryor of having done, for example, writing testimony or reviewing testimony or making recommendations about what the testimony ought to say. I think that Federal employees ought to be doing that kind of work and not contractor employees. But there was a big pressure, a big push on the part of the last administration to try to privatize as much as possible.

Mr. Fazio. In fact, at DOE there was an effort to do away with the Department. That was not particularly good at reassuring people they were going to be around for a while.

PAY COMPARABILITY

Mr. Tuck. That signals to a lot of bright people who are wearing the DOE hat that they would be better served going to work for one of the major laboratories. That is what many of them have done. I don't want to miss the opportunity to make this point on pay. For lots of reasons pay levels for Federal employees have been kept at low levels.

Mr. **Fazio**. They are about 25 percent below the private sector.

Mr. **Tuck**. I am not just talking about across a broad spectrum of talents. I am talking about what a competent nuclear engineer is worth in the private sector.

Mr. **Fazio**. Probably a good deal more.

Mr. **Tuck**. A heck of a lot more. We are finding over the years arrangements were made to make sure we could have the benefit of that talent paid for by the same U.S. Treasury, but through a different set of wickets so we weren't forced to deal with a particular pay cap.

The nutty situation that comes to mind while we have been on a talent search to try to attract people to come to work for the Department of Energy is one individual who is a retired flag officer in the military. We had the word out that we were looking for that particular set of talents, and he came to look at us ahead of time but he didn't want to have his pension impacted. He was interviewed by the Los Alamos National Laboratory people. He was not hired, but he was offered a serious job at about 170 percent of what we were able to pay him, and he would have been able to retain his pension, all of which would have been paid for by the government anyway and as an employee of the University of California.

Mr. **Fazio**. I am not sure how long that arrangement will last. I am hopeful it will continue myself. Judging by the direction some of my colleagues in California are taking, it may not be around forever.

FOLLOW-ON TO LANCE

I want to follow up on Mrs. Boggs' question. We are moving into a process that will be inexorably leading us to higher and higher dollars spent for not only the Follow-on to Lance, but SRAM T, and the air launched missile, as well as the W-82 nuclear artillery shell, while it is pretty clear that by the end of the year, maybe by the end of the fiscal year, we will be talking about one Germany.

I question whether one part of it is going to target nuclear missiles. We are talking about the Warsaw Pact. I saw pictures today of the Soviet troops waving as they were leaving. It is not over, but they are leaving. It is just a matter of whether we can figure out a time schedule for this.

We saw an ammunition dump blown up in Czechoslovakia the other day. People didn't know what it was for a while, but that is what it was. We have an equal number of Soviet and U.S. troops, at least potentially. In the next six months, we might well know.

Do you really think we ought to begin the process of going forward on a pretty rapid ramp up on these three systems?

Dr. **Barker**. The systems you mentioned, Mr. Fazio, are not in production in fiscal year 1991. As I responded to Mrs. Boggs, I believe the right time for us to be able to answer that question is more like a year from now than right now. SACEUR is clearly undertaking a major examination of his own requirements.

Within the Department of Defense all Commanders-in-Chief are being asked to give serious examination to their requirements.

Mr. **Fazio**. We will be doing the same here in Congress.

Dr. **Barker**. Absolutely. I think that is exactly correct. Speaking personally now, I think both the Congress and the executive branch have fallen into a trap in the decision train by asking whether or not we should propose monies for a system. We check a box that asks: will it be deployed; and will NATO accept its deployment?

If the answer is no, the implication is to stop proceeding with the acquisition. I think that is an error that both branches of government have slipped into. Instead, we should ask ourselves the question: do we believe U.S. objectives world-wide are enhanced by having such a capability in the U.S. inventory even if it is deployed solely at depots in the United States?

If the answer is no, we should not be buying that system. I don't think those are easy questions to answer, but the forward deployment in Germany of the [deleted] should not become the be-all and end all in deciding whether or not to buy those systems.

SRAM–T

Mr. **Fazio**. I appreciate your candor. I know you said it was your personal view. I am sure that would be underscored. I think that presents us with a dilemma.

[Deleted.]

Dr. **Barker**. [Deleted.]

Mr. **Fazio**. [Deleted.] We will put off the decision until some date in the future. We have had this debate, you and I before. It gives us a feel for what drives our policy, because your personal view at some point becomes official.

Dr. **Barker**. Your questions are good ones. I suggest that neither of us has the data or will have the data in hand before it is finalized. I think that a year from now is exactly the right time to engage in the discussion about whether or not we will forward deploy weapons. If we won't, is there a valid argument for still wanting them in our inventory?

Mr. **Fazio**. I think that is a valid point. We ought to debate how far we can afford to go this year and how much money we are willing to risk, you know, if we don't decide to build a system simply to stockpile and wait for a new threat or a new strategy to require their deployment some place else in the world.

Dr. **Barker**. Do you agree with me about the need for FY 1991 R&D dollars for the three systems you mentioned?

Mr. **Fazio**. I think that is true. I think the ramp up in what we saw in the charts is what we are concerned about, when the $3 million becomes $45 million. That is what we have to be thinking about.

It doesn't look like a lot of money now, but it commits us to moving toward sizable expenditures for systems that we may have no immediate utility for, unless we are talking about using Lance some other place. Maybe that was the implication of your comments earlier.

Dr. **Barker**. Unfortunately, world events don't track with the U.S. budget cycle.

Mr. **Fazio**. That is an understatement. We both could agree with that.

VISITS TO DOE FACILITIES

Dr. **Barker**. While I have the floor, could I comment on one of your questions, two questions ago to Mr. Tuck?

You are busy ladies and gentlemen, but in terms of your responsibilities vis-a-vis the DOE Defense Programs budget, my personal observation is that there is nothing like a visit to those facilities to see where they lack maintenance and support; to have an opportunity to see what those production lines are like; to see the incredible barriers, the genuine concern about health and safety, that have been introduced to our ability to get eight hours of work out of an eight-hour shift.

Under my initiative, the Nuclear Weapons Council Standing Committee takes a trip once a year for the purpose of educating the people from the Services who are on the committee about the DOE complex. We also extend invitations to senior staffers from all the committees of record to provide them an opportunity to join us.

Each year we visit three DOE facilities and one DOD facility to familiarize ourselves with their activities. Clearly the senior members of the staff of this committee are welcome on the trip and to the extent that you have the time, I recommend a visit to Rocky Flats or Savannah River. The trip is a week and this year it is going to be in the latter part of October. I am speaking for John Tuck. I am sure he, too, would welcome a visit.

Mr. **Fazio**. Maybe John could call my opponent and ask him to give me a week.

I have a lot of questions for the record.

Thank you.

Mr. **Bevill**. Mr. Chapman.

Mr. **Chapman**. Thank you, Mr. Chairman. This is my first opportunity to visit with any of the witnesses today.

I have thoroughly enjoyed the hearing. I appreciate your candor and your testimony. This is my first real opportunity to hear decision-makers in the position you are in. I will be brief, Mr. Chairman. man.

I have some questions that may exhibit, if anything else, perhaps a lack of knowledge on my part about the interface between the DOE and the DOD, but permit me if I may.

RAIL GARRISON MX MISSILE

What difference is it going to make on the Armed Services side this year on recommendations for the small intercontinental ballistic systems or the Rail Garrison MX? How does that interface with what you do from the standpoint of the number of warheads, the budget, and the decisions that Congress and the administration make vis-a-vis our nuclear deterrence?

Does that translate instantly into a year or two down the road? I don't want you to have to go for an hour, just tell me how that interface works.

Dr. **Barker**. Let me start. The Rail Garrison MX, the railroad based version of the MX missile, would be accomplished by removing already existing MX missiles from silos and putting them on launchers that are mounted on railroad cars. There is no new warhead construction requirements for the DOE associated with that deployment.

Clearly the Department of Energy scientists who designed those warheads and the engineers who built them would be consulted extensively for evaluating whether moving those warheads on rails would expose them to environments that could make them ineffective. So we would rely on the laboratories to assure us that by operating in this mode we would not be doing anything that would compromise the effectiveness or safety of those weapons.

In terms of new production burden: the weapons for Rail Garrison MX have been built. The warheads for the small ICBM are a gleam in somebody's eye. The DOE has not concentrated on them. Our thinking until now has been that if that system were ever approved the warheads that would be deployed on those missiles would be identical in characteristic to the warheads already built for MX. We would expect the scientists and engineers to validate that the shake, rattle, and roll associated with a ground mobile system is something that the warhead could survive and still be safe and effective.

DELIVERY SYSTEMS

Mr. Chapman. From the standpoint of our inventory of warheads compared to the inventory of our delivery systems, how does that interface work?

Dr. Barker. We have [deleted] warheads in the inventory, with 25 different weapon types ranging from thousands of warheads aboard sea-based ballistic missiles to the old model of the 8-inch artillery shell built in the early 1960's. We have [deleted] of those still in existence.

We also have [deleted] B53 bombs in the inventory.

Mr. Chapman. There was a time nearly 30 years ago, when we had many more. What have we done with the actual missiles or the way we delivered warheads? We had [deleted] at one time?

Dr. Baker. Yes.

Mr. Chapman. We are now to [deleted]. When we had [deleted] warheads, did we have a way to deliver those at that time?

Mr. Baker. Yes. The Joint Chiefs of Staff has original plans that would enable the delivery of every single weapon in the inventory.

Mr. Chapman. [Deleted.]

Dr. Baker. [Deleted.]

So of the [deleted] weapons in the inventory, I could not define how many individual delivery systems there are. A bomber may carry 10 bombs, a ballistic missile, 10 warheads, but if you look at a tube, there are no artillery shells associated directly with that. They are stored separately and you bring the shells from the point of storage to the tube that would launch them.

WEAPON SAFETY

Mr. Chapman. When we talk in terms of technology that we can build a safer warhead today than we could 20 or 30 years ago, it brings up the possibility that there is something inherently unsafe about the older ones in the stockpile. Is there? Are we talking about just a matter of degree here or do we actually have warheads in inventory out there that are dangerous?

Dr. BAKER. Those of us in the business are too prone to believe that obviously everybody understands there is some level of risk associated with nuclear weapons.

To some people we give the impression there is no risk. That is the wrong impression. A nuclear weapon will never be risk-free. Conceivably, an accident so violent could happen that you could cause plutonium to be dispersed which would cause a health hazard. So there are risks that we accept—that this committee accepts—in the day-to-day execution of my responsibilities. We have accepted risks as long as nuclear weapons have been in existence.

The two departments bring safety experts together to go through every weapon in the inventory. They try to understand what, if any, new information may have been gathered in the previous year that would impact its safety. They also make a determination if something happened to this weapon that would cause us to want to withdraw it from the inventory.

While I have been in the business, the answer has never been, yes, but there have been cases where we have discovered changes that have caused us to make retrofits, to modify the warhead to overcome something that we anticipated might happen in the future if the kind of changes we saw were allowed to continue.

Mr. CHAPMAN. As one of those who would very much like to see the weapons facilities, let me ask again in a candid way, if we do that, if we were to take a few days and go out and look at these facilities, are we going to get a pretty fair and accurate view?

We are talking about contractor-operated facilities. If they know a handful of Members and senior DOE officials are coming, I assume they would scrub down whatever we were going to look at.

Mr. TUCK. There is not much work you could do at Savannah River. But you are invited. There are so many people who are parading through the facilities over the course of the last couple of years that I don't think, with all due deference to your position as a Member of Congress, that one more congressman would make a difference.

Savannah River has seen them come and go repeatedly. It is proper that you do get the opportunity to see the facilities. I don't think that you will experience—what we used to do when higher ranking admirals came to visit, just put on a fresh coat of paint and show the Admiral around. I think you will get a very straightforward impression, and that is the way Admiral Watkins would want it.

At Savannah River you will see 35-year-old reactors, some parts by no means up to spec in terms of what we would like to see operating there.

Mr. CHAPMAN. One final question, Mr. Chairman.

If you will gaze into the outyears for us for a few minutes, what are we looking at cost-wise to do the job we really need to do?

Mr. TUCK. Just the weapons complex or the attendant facilities?

Mr. CHAPMAN. Both.

MODERNIZATION

Mr. **Tuck**. Admiral Barr, who is the Chief Steward, can tell you what it would take to replicate, that is to modernize, update the entire weapons complex given some important assumptions. But you have to understand those assumptions.

For the environmental restoration and waste management dollars, I request that you take our word, $19 billion over the next five years, and then ask Mr. Duffy when he appears before you with more specificity how that would look beyond that five years.

Admiral **Barr**. I would have to heavily caveat this. We are again looking at the modernization study that was presented to Congress a little over a year ago. We are looking at several possible options for relocation or consolidation of the nuclear weapons complex. If you were to take three major components in my area, Y-12 at Oak Ridge, Rocky Flats, and Pantex and build new ones, very roughly estimated, you are talking something close to $20 billion and a long time, a very long time.

We don't reasonably think that you can get that done before about 2015. That is a rough estimate, but that is the kind of money you are talking about.

Mr. **Chapman**. That would be in addition to continued operations at present facilities?

Admiral **Barr**. Yes. One of the things that you see is that we have a lot of very old facilities and we are getting to the point where we can't count on those old buildings for too much longer.

Whether we move the whole thing and put it some place new or build new ones right next to the old ones, if you could do that, there is going to be a substantial capital investment needed in order to get the complex into the 21st century—or past the first part—and we need to determine what we want that complex to look like.

It is not a matter of whether you want to spend the amount of money I mentioned to move everything. Something on the same order is probably going to be needed even if you just try to build everything over again in place.

It is one of those things that we have not done over the years which we in hindsight should have done.

CAPITALIZATION RATE

Dr. **Barker**. There is one point that is always shocking. Two years ago on one of these trips, people at Savannah River showed us their rate of capitalization over time. The people managing the facility, Dupont, made the point that the rate of capitalization at Savannah River was half to a third of the rate of capitalization of their own production facilities in Delaware, and that this was not a secret from any of the preceding administrations or preceding Congresses. If you add up the total over the course of time, it shouldn't be a surprise to anybody that you find major infusions of capital are necessary to restore these facilities.

The time happens to be now.

Mr. **Fazio**. Would you yield?

You say it wasn't a secret to any administration nor to Congress, but did anybody ask to increase funds to invest in those facilities to the same level that Dupont was investing in Delaware in their private facility?

Dr. **Barker**. Obviously not.

Mr. **Fazio**. Nobody ever acted on it so now we have a huge bill to pay. The staff says that you did and we never gave it to you.

Dr. **Barker**. Your staff has a much better history on this than I do.

Mr. **Fazio**. I was not made aware of the continuing deficit, of the failure to invest in plants and equipment. There were those who thought the last administration put the pedal to the metal to turn out nuclear weapons to make clear to the Soviets that we were never going to slack up. The charter was to make a point politically that has brought us to the arms control agreements we are on the verge of signing today, but that implies we were never going to need a nuclear weapons facility program for the future. We were going to bring war to its inevitable conclusion, and we wouldn't need these.

Dr. Barker is saying we are going to need them for deterrence, or at least the capacity to develop nuclear weapons. John, do you want to comment?

Mr. **Tuck**. I remember also that the build rates that the Department was asked to produce were something like [deleted] weapons in 1978, then we ramped to over [deleted] weapons in the early to mid '80s to put the other 10 percent of these weapon systems together. We paid for 10 percent and the other Departments 90 percent.

As we tasked the system to do that, this committee and others put a great deal of money into modernization of the strategic stockpile. We just didn't do it for capital improvement purposes. We did it to meet the new DOD-defined requirements and this committee was very supportive. You had to be to give us that kind of money to produce that weaponry.

Things started to level out about 1985 and the prespective and emphasis changed. The laws were made in some instances retroactive.

Mr. **Fazio**. Isn't it that we did not impose on ourselves NRC standards that we knew ought to be there regardless of whether there was an environmental law with reference to DOE? Wouldn't you agree?

Mr. **Tuck**. I agree that attitudes changed in the wake of Three Mile Island and it took a while for that to get to the weapons complex. Now we are in the situation where we are going to have to do business differently.

Mr. **Fazio**. Do you think if we were running these programs at the Department with Federal employees from top to bottom, if we hadn't passed the law in effect to use contractors, would it have been similar?

Mr. **Tuck**. I think if we had better management in the DOE and more competence in the oversight areas, we would not be in this situation today. If people knew what they were seeing and expected, I don't think there was the emphasis on the part of management at the time that I alluded to, the emphasis was make sure we meet production, whatever the DOD says its requirements are and that is how we spent our time and our effort and our management talent.

Dr. **Barker**. Let me suggest that the best data on this issue are with some of the more experienced members of your staff. We should also contact some of the managers who are now retired. I certainly remember from in my own past instances where there was no incentive for a contract facility to not ask for the money for capitalization.

I believe you will find that they asked for it routinely.

Mr. **Fazio**. The staff points out that since 1980 we have tripled this program's funding. I don't know what the requests were.

FORMALITY OF OPERATIONS

Admiral **Barr**. One of the things that Admiral Watkins stressed is formal and disciplined operations. In my background, which is nuclear submarines or in the NRC world, people understand what that means. That is a whole set of things including meaning that you want things formal and disciplined in such a way that when you proceed to do something, you have a procedure that has been approved, people are trained to do it and they do it on a well-maintained plant.

The change that we are going through now is, I think, going to help us to identify and keep identifying the kind of problems you are discussing—which might in the past just have been unobserved, and which accumulated over the years until all of a sudden you find yourself in a difficult position.

It is hard to pay too much heed to this formality of operations. It is very important.

Mr. **Fazio**. We are all very impressed on this subcommittee with the Navy's nuclear program. There is a whole culture there which is almost impossible, it seems to me, to transfer to DOE contractors at this time.

I would love to think that some of your training and skill and that of Admiral Watkins will come in handy, but you talk to people who are there now and they kind of despair of that kind of system being implanted.

In fact, they don't want anybody to try because they are afraid they will get some good ideas about changing their program, which they are opposed to.

Admiral **Barr**. Everybody does at first. Once you get into it, it is different.

Mr. **Chapman**. Mr. Chairman, thank you very much.

Mr. **Bevill**. There has been some very interesting discussion here this afternoon. A few weeks ago we had 32 Russians here on the inspection teams. I had an opportunity to have lunch with them. The three deputies spoke, and the senior deputy made the point, he said, "You Americans don't know what to do. You want to cut by a percentage, and we agree to that. You want to cut weapons, we will agree to that. It is interesting to watch you, you don't know what to do without an enemy."

I thought that was an interesting observation, and there is some truth to that. We have been fighting the Communists all these years and all of a sudden they have joined us and we don't know what to do. We are used to fighting them. It is a big change for us, too. I do think that your work is going to continue regardless of any agreements. There are not going to be any major changes in our research and development. I hope not. We have the best scientists in the world, and I have always felt this is the strength of our country, the scientists.

You people can come up with new ideas and new weapons faster than the Russians can steal our secrets and that is pretty good. So long as you can do that I think we ought to fund you. We have pretty well done that at Rocky Flats and Savannah River.

We appear to be watching the end of Communism here or the beginning of the end of Communism would be a better way of saying it. I think it is going to take a little explanation on the Floor for these increases, but I think you have done a pretty good job of explaining it. We appreciate the good work you have done.

John, we are glad to see you moving up the ladder. It is our custom to put your biographical sketch in the record for your first appearance here. We have that and it will be placed in the record.

Dr. Barker and Admiral Barr, we appreciate the fine testimony. Secretary Tuck, you will be back with us tomorrow.

Mr. Tuck. I look forward to it.

WOMEN AND MINORITIES

Mrs. Boggs. Mr. Chairman, I was just thinking about the sensitivity of the work that is done by this part of the Department of Energy, particularly in the safety areas and the environmental areas. I was very pleased with Admiral Watkins' review of the numbers of minorities and women who are moving up in the Department or have moved up in the Department.

I was wondering if there are more, in addition to the people in this room who are in your particular division, who have responsibilities that are commensurate with the sensitivity or the importance of your agency?

Mr. Tuck. I think that we should respond further in that regard. The instant case that comes to mind is Jill Lytle, who used to run the nuclear materials function of Defense Programs and now is running an important division for the environmental restoration and waste management team.

Admiral Barr. There is a man named Dr. James Turner, who is the head of Weapons Safety, a very, very fine man.

Mr. Tuck. If you would like, I would be delighted to send up more specific examples.

[The information follows:]

Women and Minorities

Defense Programs employs 1,307 women and minorities: 193 of those are in grades GS-13 to 15; 156 are in grades GM-13 to 15; and 4 are at the SES level.

Mrs. Boggs. I was very pleased to see three women in the room, but I don't see any minorities. Thank you very much.

Mr. BEVILL. Most of the testimony we have heard today has been on issues, and I don't think anybody is disappointed in that.

The Committee will adjourn until 10 o'clock in the morning, and thank you for your testimony.

[The statements of the witnesses and questions and answers for the record follow:]

BUDGET REQUIREMENTS

Mr. Bevill. With the recent changes in Eastern Europe and historical political reforms in the Soviet Union, it must be very difficult to manage and plan this country's nuclear weapons program. Does your FY 1991 budget reflect the impact of such proposals as troop cuts in Europe and negotiations to cut long-range nuclear arsenals in half? What plans do you have to respond if these proposals become a reality?

Mr. Tuck. Our budget is rather insensitive to the reductions you have indicated. As long as this country continues to rely on a nuclear deterrent, DOE must operate the nuclear weapons complex in a safe, secure, and environmentally acceptable manner to maintain the nuclear weapons stockpile, whatever size remains. DOE's nuclear weapons complex is basically a single-track system which means we have little or no redundant capability. If one process is shut down for any reason, the entire weapons production and maintenance capability is ultimately affected.

To the extent the initiatives you indicate results in a reduction to specific DOD systems, there would be a relatively small change in DOE direct system support. I should also point out that some of the options being considered as part of the START Treaty discussions to reduce our nuclear arsenal may actually cause increases in our budgets. Depending on the protocol selected, we would have to disassemble, process, and store the nuclear materials from the weapons retired by the Treaty. These actions would put additional pressure on our complex. We are evaluating what the specific effects might be. We will work with the Committee to the extent necessary to coordinate such actions.

PLANS FOR ROCKY FLATS

Mr. Bevill. The Committee has watched with much concern the situation at the Rocky Flats Plant in Colorado. What is the current plan for that site? What other options are available to the Department to meet plutonium requirements?

Mr. Tuck. We plan to resume operations in the plutonium processing facilities in the third quarter of this year after the activities necessary for resumption have been completed. I must add that there is some uncertainty because of possible legal challenges. The Department currently has no other options to meet plutonium requirements for nuclear weapons. The capability to manufacture plutonium pits for weapons requires highly technical processes to assure product quality and the health and safety of the workers and the public. Capability to manufacture one-of-a-kind pits for special tests exists at the Los Alamos National Laboratory, but capacity for production scale manufacturing of plutonium pits does not exist anywhere in the complex except at the Rocky Flats Plant.

Mr. Bevill. What options are available other than renovating Building 371 at Rocky Flats? Please provide the amounts of material that can be obtained from each option.

Mr. Tuck. There are generally three options to renovating Building 371 at Rocky Flats. The first is to continue to utilize the existing buildings 771 and 776 along with facilities at other sites until they can no longer be maintained. The continued cost of maintaining these buildings will be high, and they will not be able to produce the required amounts of plutonium nor enough of the required quality for weapons production to meet the stockpile memorandum. Worker exposure to radiation in these buildings is higher than it would be in Building 371, and cannot be reduced significantly without extensive renovations. Renovation of the existing buildings would cost significantly more than the cost of renovating 371, and would require a significant downtime, with resultant loss of production. After renovation, the buildings would still not meet all of the new design criteria that DOE is now requiring. A key aspect of this option is the continued use of facilities at Los Alamos and the use of new Savannah River facilities. This would ease the processing "crunch" somewhat, but would not totally alleviate the problem. Los Alamos National Laboratory can produce up to *Deleted* of plutonium per year without severely impacting the research function, but with some increase of radiation exposure to their workers. Savannah River can, with some modifications, produce up to *Deleted* of plutonium per year. Even with use of both facilities, plutonium capacity and capability would be inadequate to process site returns and resultant residues.

The second alternative is to build a new plutonium processing building in another location. This would require at least an additional 3-5 years for siting and environmental documentation, and would cost at least $300-400 million more than renovating 371, because a complete new building would have to be constructed. In addition, a significant addition to our transportation assets would have to be made to transport plutonium from Rocky Flats and plutonium metal back, since the machining operation is located at Rocky Flats.

The third alternative is to move the Rocky Flats operations. Although this alternative would be desirable because it would move plutonium operations from a metropolitan area, the process would take many years and cost in excess of $6 billion, in today's dollars. The Department is examining this option for the long term under the updated modernization study, but it does not meet the need for providing plutonium processing capability for the near future.

The Department has, therefore, determined that the renovation of Building 371 is the lowest risk solution to assuring plutonium processing operation. It will house those operations in a modern, safe building meeting up to date safety and environmental design standards. The renovated building will provide reduced worker radiation exposure, environmental safeguards, reduced waste generation, and a hardened, accident resistant structure.

TRITIUM PRODUCTION

Mr. Bevill. The Savannah River reactors have not yet been restarted, and no firm date for restart has been established. What impact has the lack of tritium production had on weapons production activities to date?

Mr. Tuck. The only adjustment to warhead or bomb production plans that has resulted from the Savannah River reactor shutdown has been *Deleted* Other stockpile management actions have been affected to reduce tritium demand; *Deleted*

Mr. Bevill. At what point will the lack of new tritium production adversely impact the nuclear weapons program? What contingency plans have been developed by the Department in the event of a tritium shortfall?

Mr. Tuck. If, for some reason, the Savannah River reactors were not to restart, significant risks in meeting essential tritium demands for the stockpile would begin-to be incurred *Deleted* The Department of Defense has developed, at the direction of the President, a set of stockpile contingencies in response to various reduced tritium production levels.

Mr. Bevill. The Department has established many types of oversight of the weapons complex and programs. At this time, how many different groups and safety review boards are auditing or reviewing the production facilities and activities? How are you responding to all of the recommendations?

SAFETY OVERSIGHT

Mr. Tuck. There are three primary groups that provide the Department of Energy with independent safety oversight of the weapons complex and facilities. Two were established by the Department, one by the Congress.

In 1987, the Department, at the recommendation of the National Research Council, established the Advisory Committee on Nuclear Facility Safety -- the "Advisory Committee" -- to provide technical information, advice, and recommendations concerning the safety of the Department's production and utilization facilities, including the Department's production, test, and research reactors and nuclear processing facilities.

The Committee is composed largely of recognized experts in the field of nuclear energy from outside the Department of Energy who are appointed by the Secretary of Energy under the Federal Advisory Committee Act.

The Committee's recommendations have influenced decisions pertaining to the future startup of the High Flux Beam Reactor (HFBR) and the Savannah River Reactors P, K, and L. It has provided numerous comments and recommendations on the Department's nuclear safety policy development and other nuclear facilities including the Waste Isolation Pilot Plant, the Advanced Test Reactor, the Fast Flux Test Facility, Y-12, Pantex, and the Experimental Breeder Reactor.

The role of the Advisory Committee, as its name suggests, is to advise the Secretary on matters of nuclear facility safety, both as regards specific nuclear facilities and general issues of safety as they relate to our nuclear programs.

The Defense Nuclear Facilities Safety Board, which I will refer to as the "Defense Board," was established by Congress in 1988. It reviews the operations of the Department's defense nuclear facilities, provides recommendations to the Department, and reports to the Congress on its findings and activities.

To date, the Department has received two sets of recommendations from the Defense Board. We are in the process of evaluating those recommendations and making appropriate responses through the formal procedures set forth in the law.

As a statutorily established independent review board, the Defense Board's actions and recommendations are more formal and their focus is more narrow than that of the Advisory Committee. As their name implies, their primary focus is the Department's defense nuclear facilities.

The Department of Energy's Office of Nuclear Safety was established on September 28, 1989, Secretarial Notice SEN-6A, to provide the Secretary an additional element of independent oversight of line management performance, including self-assessment; to assure proper development and implementation of reactor and nonreactor nuclear facility safety policies and standards throughout the Department; and to enforce the civil penalty and criminal referral provisions of the Price-Anderson Amendments Act of 1988. The Office of Nuclear Safety's focus, like the Advisory Committee, is broad, covering not only the facilities, but safety issues related to the Department's nuclear program as a whole.

In addition to these three primary oversight entities, there are a number of other Departmental efforts aimed at improving the level of safety at the nuclear facilities. These include the Department's Self-Assessment Offices within the line programs and the Office of the Assistant Secretary for Environment, Safety, and Health (EH), which has responsibility for oversight of worker safety, radiation protection, and health matters. EH is also heading the Tiger Team assessments of DOE's facilities.

MODERNIZATION

Mr. Bevill. How will the requirement to complete an Environmental Impact Statement on the Weapons Complex Modernization Plan impact this activity? Are you performing modernization activities before the EIS is completed? If so, what types of activities?

Mr. Tuck. Under the regulations of the Council on Environmental Quality for implementing the National Environmental Policy Act, NEPA, actions that would be addressed by the Defense Modernization Plan may proceed prior to completion of a programmatic Environmental Impact Statement, EIS, if it meets three criteria. First, the action is justified independently of the program for which the programmatic EIS is to be prepared; second, the action is accompanied by an adequate EIS or other appropriate NEPA documentation; and third, the action will not prejudice the ultimate decision of the programmatic

EIS. It is the Department's intention to follow these regulations and criteria in the planning and implementation of its defense complex modernization activities. For many of these activities, justification exists on the basis of compliance with existing laws or regulations or Departmental Orders to protect worker and public health and safety and the environment. In addition, we have some immediate needs to upgrade the maintenance, safety, and productivity of the facilities throughout the complex which will continue over the next several years. In any case, appropriate NEPA documentation will accompany Departmental activities, including an EIS where it is determined that an activity is a major Federal action that could significantly affect the environment. To this end, the Department recently issued Secretarial Notice SEN-15-90, National Policy Act to all Departmental elements. This notice is intended to assure full incorporation of NEPA requirements early in project planning and serve the goal of environmental "full disclosure" as a furtherance of the Secretary's 10-point initiative of last summer. Finally, the Department recognizes the importance of completing the programmatic EIS so that planning for the Defense Modernization Project is based on a thorough consideration of the system-wide impacts of broad policy alternatives.

Mr. Bevill. How might future arms reduction treaties impact the need for modernization?

Mr. Tuck. The nuclear weapons complex of the Department of Energy must be modernized to continue providing the nuclear weapons that support the nation's nuclear deterrent policy. A review of the 1988 Modernization Study is underway which includes the requirement for the modernized complex to have the flexibility to adapt to a broad spectrum of potential military, political, and technological futures, including the impact of successful arms reduction treaties in the future.

RESEARCH, DEVELOPMENT, AND TESTING

Mr. Bevill. At the proposed funding levels, is core R&D and Testing capability being maintained at the national laboratories?

Mr. Tuck. No. Funding for core R&D and Testing has been decreasing in real terms resulting in a reduction of manpower and nuclear testing levels. We are concerned about this, but feel the FY 1991 budget represents an appropriate balance of resources.

Mr. Bevill. Has our ability to develop and maintain reliable weapons without testing appreciably changed since last year?

Mr. Tuck. No, but we continue to improve weapon performance predictive capability issues in such areas as boosting, yield scaling, and nuclear safety. These areas and others are discussed in detail in the classified annex, Volume II, to the "Program Status of Preparations for Further Limitations on Nuclear Testing" which was sent to Congress on February 22, 1990.

TRITIUM PRODUCTION

Mr. Bevill: Last year the Department testified that the lack of tritium production would become critical if the reactors were not started by December 1989. The reactors have not started, and now the critical date has changed. What has occurred to accommodate this slip in production capabilities?

Mr. Tuck. The Department of Defense has reduced their demand for tritium.

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In addition we have implemented changes to our tritium operations to use our tritium inventories more effectively. Examples are upgrades to the SRS tritium reservoir cutting and loading capabilities and relocating tritium inventories to the SRS by reducing working inventories at other sites, primarily Mound.

IMPACT OF TEST BAN

Mr. Bevill. Please describe the impact of a comprehensive test ban on the U.S. programs. Compare this with the impact of such a ban on the USSR nuclear program.

Mr. Tuck. The United States relies on the credibility of its nuclear forces as the foundation of its policy of deterrence. The U.S. must maintain an effective, survivable, and varied nuclear force to convince any adversary that we could retaliate decisively in the event of aggression against us or our allies. If, in fact, the numbers of nuclear weapons in our arsenal decreases due to arms reduction agreements, it will be more important than ever that the weapons that remain are reliable and fully credible. Moreover, a rapidly changing world situation dictates that we keep our technology options open in order to respond to those changes. A complete ban on nuclear testing would do serious damage to the credibility of the deterrent and, thus, could seriously endanger world peace and stability.

A nuclear test ban would eliminate our ability to perform nuclear confidence tests of the current stockpile. This would prevent detection and/or correction of possible stockpile problems in the future. Nuclear tests are also necessary to verify that any fixes made to deteriorating or faulty weapons do not adversely affect weapon performance in unexpected ways.

Under a test ban, new developments required to maintain the credibility of our deterrent into the future in the face of changing threats could not be pursued. Recall that delivery systems and their associated nuclear weapons are often made obsolete by non-nuclear developments that the Soviets will pursue regardless of nuclear testing. Examples of these are improvements in Soviet air defenses, hardening, dispersal of forces, and mobility. As time goes on, more and more nations will be capable of launching long-range missiles and must be factored into the future defense posture of the Nation. Incorporation of some of the most modern nuclear weapon safety and security measures would also not be possible under a nuclear test ban. The nuclear weapons in the stockpile are as safe as it was possible to make them when they were produced. However, if improvements can be made, we should not have to compromise because of an inability to certify performance through nuclear testing.

A critical aspect of future technology involves the development of Nuclear Directed Energy Weapons, NDEW. Thorough exploration of NDEW concepts involving nuclear explosives will not be possible under a test ban. As a result, assessment of U.S. vulnerabilities to possible Soviet directed energy weapons of these types will be precluded. In fact, all testing to assess the vulnerability to nuclear weapon effects of U.S. military systems, such as missiles, aircraft, radars, and surveillance satellites will be severely limited by a halt to nuclear testing.

A significant effect of a comprehensive test ban, CTB, on the U.S. program would be the inevitable loss of many in the small cadre of experienced nuclear weapon scientists and engineers in our national laboratories. This happened during the brief moratorium of the early 1960's. When it is not possible for a scientist to conduct technically satisfying experiments, active scientists will seek other areas of work. This exodus would compound the difficulties of analyzing and correcting future stockpile problems. Cost savings will be virtually non-existent because the nuclear design laboratories, the test site, and most of their facilities will still have to be maintained. Construction and operation of any permitted experimental facilities would more than offset possible savings from standard underground nuclear testing. These facilities would still be woefully inadequate in fulfilling nuclear design and stockpile maintenance needs.

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Mr. Bevill. Describe the Administration's position on any test limitation treaty negotiations with the Soviets and how this position is integrated into the overall arms negotiations position.

Mr. Tuck. The United States has a step-by-step approach to negotiating any further limits on nuclear testing. We are currently trying to conclude detailed verification protocols with the Soviets that would permit the Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty to be ratified and implemented. These protocols involve new and complex techniques necessary to provide effective verification for the treaties. We believe it is necessary to proceed with the ratification of these treaties and their protocols and, as a practical matter, to observe their implementation. This period of implementation will give both sides valuable additional experience with the new verification procedures and methods agreed to. After a period of observation, we will be better able to assess the verification lessons learned and also to determine the additional moves that make sense from a national security standpoint.

We have said repeatedly that a Comprehensive Test Ban, CTB, remains a long-term goal of the United States. We have also said that a CTB must be viewed in the context of a time when we do not need to depend on nuclear deterrence to ensure international security and stability; in other words, when nuclear weapons play a less important role in the world.

And so, despite recent changes in the European political climate, and despite the exciting and rapidly-paced arms control agenda, the U.S. still relies fundamentally on nuclear deterrence for its national security. As we have said many times, as long as nuclear weapons play a critical role in our national security strategy, we must be free to conduct nuclear tests to ensure the credibility of our forces.

Mr. Bevill. Have there been any changes in the attitude of the Soviets that seem to indicate a departure from the past difficulties on implementing a test ban?

Mr. Tuck. No. The Soviets have remained formidable and very business-like negotiators in our discussions regarding the Threshold Test Ban Treaty.

DOD COORDINATION

Mr. Bevill. What role does DOE play in analyzing the increased defense capability versus the cost of various weapons configurations? Is this an appropriate role? Has it changed recently?

Mr. Tuck. Cost versus capability tradeoff studies are conducted jointly with the Department of Defense for each warhead program which is ultimately approved for development, production, and deployment. The Department of

Energy warhead cost estimates are used both within the DOE and in DOD system acquisition reviews to ensure that DOE costs are weighed in programmatic decisions. This process was solidified in implementation of the recommendations from the President's Blue Ribbon Task Group on Nuclear Weapons Program Management which was mandated by the FY 1985 Defense Authorization Act. No recent changes to this process have been effected.

Mr. Bevill. Please describe the coordination efforts with DOD in developing the FY 1991 weapons activities budget request.

Mr. Tuck. The Department of Defense and the Department of Energy jointly develop the stockpile requirements under the aegis of the Nuclear Weapons Council. The projected stockpile requirements, on a year-to-year basis, are reviewed by DOE in order to determine executability in terms of nuclear weapons complex capacity, nuclear materials availability, and budget constraints. The current and budget year requirements are analyzed closely to ensure that the DOE budget reflects as accurately as possible the required resources to fulfill warhead commitments. The resultant warhead requirements are then reflected in the Nuclear Weapons Stockpile Memorandum, NWSM, to the President. The Nuclear Weapons Council has recently approved a delay in submitting the NWSM to the President from October until the end of January of the following calendar year so that the NWSM will more accurately reflect the programs, and adjustments thereto, contained in the Department's Congressional Budget Request.

Mr. Bevill. Do the weapons delivery schedules included in the budget support the latest signed weapons stockpile memorandum?

Mr. Tuck.

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The production schedule presented in the budget represents the agreed-to position between the Department of Defense and Department of Energy at the time of budget submittal. The Nuclear Weapons Council is considering changes to the FY 1990 Nuclear Weapons Stockpile Memorandum before submitting it to the President. We believe our budget will be sufficient to meet the new requirements.

Mr. Bevill: Please update us on the relative capabilities of the United States and the Soviet Union with regard to quality and quantity of nuclear weapons.

Dr. Barker. Let me respond to the stockpile size first. Where the U.S. had *Deleted* weapons in December 1989; the Intelligence Community's best estimate of the Soviet stockpile was *Deleted* weapons-- *Deleted* Our highest yield weapon was a *Deleted* the USSR arsenal included the *Deleted* *Deleted* "The estimated aggregate yield carried by just the Soviet Union's land-based strategic missile force was *Deleted* while the aggregate yield of the entire U.S. stockpile was *Deleted*

The U.S. stockpile currently has 25 types of nuclear weapons. Each was designed for a specific mission and delivery systems. Our designs tend to push the state-of-the-art and require rigid quality control with very strict manufacturing tolerances. There is evident that the *Deleted* *Deleted* for several strategic missile systems. They appear to take an evolutionary approach to nuclear weapons design, giving them a nuclear weapon stockpile that is robust and rugged and with ample design margins.

Mr. Bevill. Describe the DOD nuclear weapon retirement program in FY 1990 and FY 1991. *Deleted*

Mr. Tuck. The retirements schedule for FY 1990 and FY 1991 represents baseline defense requirements. Some retirements are effected for systems for which no further military requirement exists, systems which are being retired under treaty obligations, and older warhead systems which are being retired since modern replacement warheads have been provided.

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Mr. Bevill. Describe the process used by both DOE and DOD to determine the appropriate weapons for retirement.

Mr. Tuck. The Nuclear Weapons Stockpile Memorandum formulation process leads to the year-by-year nuclear weapon stockpile requirements which requires an assessment of possible retirements. The retirements are governed by continued military need and the availability, through the production program, of modern replacement weapons.

Nuclear Strategy in the Alliance

Mr. Bevill: How does the possibility of German unification impact the need for the Follow-on-to-LANCE missile?

Dr. Barker. The Follow-On to Lance (FOTL) is being developed in consonance with the Comprehensive Concept of Arms Control and Disarmament adopted at NATO's May 1989 summit. To this date, the concept has not been altered. Moreover, it is a U.S. decision to provide weapon systems for U.S. soldiers who have commitments to respond to security emergencies on a worldwide basis. The Alliance decision whether and when to introduce FOTL in NATO will have to consider the question of German unification. Regardless of the NATO deployment decision, the U.S. requirement for FOTL remains, although the number of procured systems may change.

Mr. Bevill. Has the Secretary of Energy certified that the FOTL warhead is cost-effective and that neither the W84 nor W85 warhead is compatible with the FOTL missile?

Mr. Tuck. On July 24, 1989, the Department of Energy announced its selection of a "common" warhead for the Air Force Short Range Attack Missile - Tactical and the Army Follow-on to Lance missile systems. The common warhead was found to meet both military service requirements and was the most cost effective warhead candidate of choice. Neither the W85 warhead nor the W84 warhead were found to be compatible with either weapon system. The selection and decision by the Acting Assistant Secretary for Defense Programs was concurred in by the Secretary of Energy at the time the selection was announced.

Fernald Lawsuit

Mr. Bevill. The Committee is concerned that the proposed reprogramming to provide funds for settlement of a Fernald lawsuit will set a precedent for future settlements. What steps is the Department likely to take to ensure that the Congress will be notified and consulted before any future settlements are reached obligating the Department to provide funding which it does not have appropriated for that purpose?

Mr. Tuck. The Department would like to work with the Committee to establish a means whereby advance consultations can occur should we encounter future litigation problems like the Fernald case.

One of the problems with the Fernald case was that the Department did not have a basis to make an informed estimate of its exposure until after the summary jury trial in June 1989, after the Fiscal Year 1990 budget was submitted. Thereafter the litigation dynamics, which included an August trial date, resulted in difficult settlement negotiations with which the Department was preoccupied and as to which, until the very last, there was uncertainty as to whether the parties would reach agreement.

This is a difficult environment in which also to provide for the type of meaningful consultations we would prefer, and the Department hopes to structure its role in any future litigation to avoid being placed in this position.

INERTIAL FUSION

Mr. Bevill. Describe the accomplishments of the Inertial Fusion program in FY 1989, FY 1990, and FY 1991.

Mr. Tuck. During FY 1989 and early FY 1990, the Inertial Fusion program completed the first phase of the Congressionally mandated review of the program by the National Academy of Sciences. An interim report has been completed and sent to Congress, and a final report is due in September 1990. Phase I of the Laboratory Microfusion Capability Study was completed and Phase II initiated to include driver technology and cost. The Inertial Fusion program office conducted reviews by four independent groups, three of driver technology and the fourth of target physics. A new contract for target fabrication support to the laboratories will be competitively awarded in FY 1990. The new contract should be in place early in FY 1991.

The NOVA laser at the Lawrence Livermore National Laboratory was operated to obtain pulses with more than 124 kilojoules of energy at the fundamental frequency greater than the design specification. Implosion experiments were continued, and beam balance and beam smoothing improvements along with pulse shaping were initiated. During FY 1990, experiments at 40 kilojoules per pulse at the tripled frequency wavelength have begun. During FY 1991, experiments with large plasmas will begin.

At the Sandia National Laboratories in FY 1989, the Particle Beam Fusion Accelerator II, was brought up to full energy on trial shots. Experiments are underway in FY 1990 to concentrate that energy to full power operation. Light ion beams were focused to 5 terawatts per square centimeter and 10 terawatts per square centimeter are expected in FY 1990. During FY 1991, hohlraum target physics experiments with light ion beams will begin. Selected weapons physics experiments will be conducted on PBFA II while developing target dependent inertial fusion target diagnostics.

The AURORA laser at the Los Alamos National Laboratory was brought up to operation at the 1 kilojoule level. During FY 1990 and FY 1991, AURORA will become a reliable facility capable of five shots per week at energy levels in excess of 1 kilojoule per shot. Experiments will be conducted to explore the influence of laser technology on requirements for pulse shaping, beam balance, and illumination symmetry. AURORA will also initiate a program of experiments in direct support of weapons physics studies. This will include use of one of the 48 laser beams as a long pulse length backlighter for diagnostics.

The program at the University of Rochester/Laboratory for Laser Energetics made significant progress in techniques for providing broad bandwidth for glass lasers and in beam smoothing techniques. The OMEGA laser upgrade study was completed and the project's cost and schedule were validated by the Department of Energy. During FY 1990, 9-GHz Smoothing by Spectral Dispersion will be implemented to improve uniformity of irradiation of targets. During FY 1990, a significant breakthrough in target fabrication occurred when Rochester modified Japanese technology to produce target-quality plastic fuel shells. Plastic target implosion experiments will be conducted starting in FY 1990 using those shells. For FY 1991, Rochester plans to demonstrate production of prototype baseline hydrodynamic equivalent polymer shell targets with a gas fill. They also plan to use distributed polarization rotator plates to improve beam uniformity and also to start shaped pulse experiments on OMEGA.

The Naval Research Laboratory finished inertial fusion experiments using the PHAROS III glass laser. They initiated construction of NIKE, a krypton fluoride for short wavelength, flat target model experiments. During FY 1990 and FY 1991, Naval Research Laboratory will continue construction of NIKE and will conduct computational and theoretical studies of laser matter interaction.

Mr. Bevill. What is the status of the independent review of the IF program scheduled for submission to Congress in September 1990?

Mr. Tuck. The interim report was transmitted to Congress on February 15, 1990. The review group is continuing its efforts. The final report of the National Academy of Sciences Inertial Fusion Review Group is due to the Congress by September 15, 1990. The Secretary of Energy has asked the review group to provide additional information in that final report that could be useful for program planning. A summary of the findings in the interim report is included in an insert provided for the record.

(The information follows:)

SUMMARY FINDINGS - NATIONAL ACADEMY OF SCIENCES REPORT ON INERTIAL FUSION

a. Inertial fusion is primarily a military applications program with only potential applications as a commercial energy source.

b. Before the Department of Energy makes a decision on building a Laboratory Microfusion Facility, more effort should be expended toward resolving the remaining physics uncertainties in achieving ignition in a laboratory environment.

c. The review group recommended:

   1. Funding the "Precision NOVA" upgrade and associated experimental campaign at the Lawrence Livermore National Laboratory.
   2. Funding the OMEGA laser upgrade at the University of Rochester/Laboratory for Laser Energetics.
   3. Funding the NIKE Krypton Fluoride, KrF, laser at the Naval Research Laboratory.
   4. The AURORA laser facility at the Los Alamos National Laboratory should be configured to implode indirect drive targets and experiments conducted to evaluate KrF lasers for Inertial Confinement Fusion.
   5. Discontinue the CENTURION/HALITE program.
   6. Do not fund work on Hydrogen Fluoride lasers.

d. Major program emphasis should be on conducting physics experiments in current or upgraded facilities. This should take precedence over funding the Laboratory Microfusion Facility work or development of advanced fusion drivers.

INERTIAL FUSION

Mr. Bevill. What are the Department's plans to construct a Laboratory Microfusion Facility?

Mr. Tuck. The Department is currently studying the feasibility, utility, and affordability of a Laboratory Microfusion Facility. Phase I of the study of a Laboratory Microfusion Capability has been completed, and Phase II, including questions of driver technology and cost, is underway. The Department will decide in the mid-1990's on the question of construction of a Laboratory Microfusion Facility. That decision will depend on an assessment of feasibility, affordability, and need. By the time the decision is made on an LMF, both the National Academy of Sciences Review Group and the Secretary's Fusion Policy Advisory Group will have completed their reports.

Mr. Bevill. For each facility, provide the technical justification for the project, the forecasted results expected for each facility, and how the technical objectives of the programs are being achieved.

Mr. Tuck. The Particle Beam Fusion Accelerator II, PBFA II, at the Sandia National Laboratories in Albuquerque provides an alternative to high energy lasers as a driver for inertial fusion. That concept uses a beam of light ions to drive the imploding capsule. This alternative concept reduces the risk in developing an affordable driver for inertial fusion in a laboratory.

PBFA II is the only current inertial fusion driver that can deliver megajoules of energy to a target. It is therefore the only current driver with the potential for achieving ignition in a fuel capsule.

PBFA II is now being operated at full energy and techniques are under test for concentrating that energy to maximize the power delivered to the target. Other tests are designed to optimize sources for generating lithium ions. Experiments in focusing the beams and coupling them to diagnostic targets are under way. Experiments with imploding targets will start this year.

The HERMES III accelerator, also at the Sandia National Laboratories, was developed as a weapons effects simulator. It is also useful to the inertial fusion program as an alternative accelerator design to PBFA II. HERMES III has been operated as a positive polarity machine as is required of a light ion accelerator. That alternative design offers promise as a pre-prototype module of a driver for a laboratory inertial fusion facility.

The University of Rochester/Laboratory for Laser Energetics, UR/LLE, as a support laboratory in the inertial fusion program, operates the OMEGA laser to study direct drive, inertial fusion, driver beams focused directly onto the fuel capsule surface. Major areas of study include the drive symmetry and energy balance requirements for directly driven capsules, stability of the fuel/capsule interface, and density conditions for achieving thermonuclear ignition.

The UR/LLE is adding to the database for direct drive target interaction and compression. They have the only cryogenic system installed in an inertial fusion facility that allows them to study compression and neutron yield of directly driven cryogenic targets.

The UR/LLE, using the OMEGA laser, recently demonstrated a tenfold increase in neutron yield over last year's results. Using an x-ray framing camera developed by the Lawrence Livermore National Laboratory, LLNL, the UR/LLE was able to make a time sequenced series of 16 images during the one-billionth of a second implosion of a capsule, a spectacular achievement.

LLNL operates the world's most powerful solid state laser, NOVA, as an inertial fusion research experimental facility. NOVA is also used by researchers in a number of other fields, including weapons physics. In the inertial fusion program, NOVA is used mainly for indirect drive experiments -- laser beams converted to x-rays which then couple to the fuel capsule.

LLNL is conducting an experimental campaign on NOVA which is designed to explore the interaction of lasers with plasmas and imploding capsule physics. Issues to be explored include pulse shaping, requirements for symmetry and balance in the laser irradiation, laser-plasma coupling efficiency, stability of fuel/capsule interfaces, and target designs intended for high gain implosions.

The AURORA at the Los Alamos National Laboratory is a Krypton Fluoride eximer laser testbed. The goal of AURORA is to optimize laser architecture; to develop high quality, low cost components; and to demonstrate the applicability of a KrF laser as an inertial fusion driver.

AURORA will be used to study x-ray conversion efficiency using short wavelengths and to explore the dependence on wavelength of pulse shape requirements, plasma physics, and coupling efficiencies.

In the next year or so, AURORA will become a reliable experimental facility capable of five shots per week with beam energy greater than 1 kilojoule.

The Naval Research Laboratory conducts theoretical and experimental studies on the instabilities of fuel during the implosion of fusion capsules. Inertial fusion experiments have stopped on the PHAROS III glass laser. The Naval Research Laboratory effort is on construction of a small KrF laser called NIKE.

The goal of the NIKE development is to demonstrate a laser beam illumination uniformity on target of plus or minus one percent and continue collaboration with LANL on KrF technology development. Computational and theoretical studies of laser matter interaction will continue in parallel with NIKE development.

Completion of NIKE in FY 1993 will allow experimental investigation and validation of the results of theory and computer simulations.

Mr. Bevill. Describe the IF test program conducted in FY 1989, FY 1990, and FY 1991. How does this fit into the laboratory programs?

Mr. Tuck. The inertial fusion program office has decided to implement the recommendation of the latest National Academy of Sciences review to terminate the CENTURION/HALITE program because of cost and the diminishing value of the experimental data compared to cost and laboratory results. No tests were conducted in 1989 and 1990. No future underground tests are planned.

INERTIAL FUSION

Mr. Bevill. What is the FY 1989, FY 1990, and FY 1991 funding proposed for each laboratory and facility in the IF program? Please provide the breakout by program; i.e., glass laser, gas laser, and pulsed power.

Mr. Tuck. I will submit for the record a table showing this information. (The information follows:)

FY 1991 CONGRESSIONAL BUDGET REQUEST
INERTIAL FUSION
(B/A IN THOUSANDS)

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES			
GLASS LASER:			
LLNL	$ 64,300	$ 67,434	$ 68,000
KMS FUSION	16,800	17,040	0*
UR	12,900	11,032	12,100
TARGET CONTR. (TO BE COMPETED)	0	0	10,000
SUBTOTAL GLASS LASER	$ 94,000	$ 95,506	$ 90,100
GAS LASER:			
LANL	29,630	31,045	31,700
NRL	4,500	4,753	5,000
SUBTOTAL GAS	$ 34,130	$ 35,798	$ 36,700
PULSED POWER:			
SNLA	25,800	27,376	29,300
SUPPORTING ACTIVITIES:			
NATIONAL LASER USER FACILITY	600	591	700
OTHER	1,000	1,346	1,100
SUBTOTAL SUPPORTING ACTIVITIES	$ 1,600	$ 1,937	$ 1,800
TOTAL OPERATING EXPENSES	$155,530	$160,617	$157,900
CAPITAL EQUIPMENT			
LLNL	$ 3,367	$ 3,447	$ 3,500
LANL	1,829	1,872	1,960
SNLA	1,771	1,812	1,960
NRL	300	296	310
KMS FUSION	665	690	0
UR	0	393	620
OTHER	0	99	550
TOTAL CAPITAL EQUIPMENT	$ 7,932	$ 8,609	$ 8,900
TOTAL IF	$163,462	$169,226	$166,800

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*Reflects decision to compete target contractor in FY 1991

Mr. Bevill. Specifically, describe program plans by individual laboratory and facility for FY 1991.

Mr. Tuck. For FY 1991, the Los Alamos National Laboratory, LANL, will continue demonstration of the krypton fluoride eximer laser technology. They plan to achieve routine operation of AURORA at 5 shots per week at energies of 2-3 kilojoules. They will complete the new AURORA front-end to allow adequate target plane focusing, pulse shaping, and bandwidth. An X-ray backlighter for diagnosing of target performance will be installed, and flat target plasma experiments and hohlraum-related experiments will continue. Implosion experiments will be conducted using the NOVA laser facility at the Lawrence Livermore National Laboratory, LLNL.

During FY 1991, LLNL plans to achieve *Deleted*

The laboratory will perform single-mode planar target experiments with early non-linear behavior. They plan to achieve a fivefold increase in laser beam diagnostic sensitivity for 2 of NOVA'S 10 beams, as well as completion of the large aperture neutron spectrometer array being installed beneath the NOVA target chamber. The 30 picosecond X-ray gating camera diagnostic will be completed and installed on NOVA for improved resolution of imploding capsules.

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The Sandia National Laboratories program plan for FY 1991 calls for concentration on target experiments using the Particle Beam Fusion Accelerator II, PBFA-II. This includes indirect drive experiments with 10 terawatts per square centimeter lithium beams and increasing the power density to indirectly drive developmental targets at 20 terawatts per square centimeter lithium beams. The definition of PBFA II ignition targets will be completed, and the concept for a PBFA II energy upgrade will be selected. A small effort will be devoted to development of advanced ion beam technologies necessary for weapon applications.

The Naval Research Laboratory program plan for FY 1991 includes continuation of development and construction of the NIKE KrF laser for flat target interaction physics experiments at short wavelengths. The computational and theoretical studies of plasma instabilities will continue as well.

During FY 1991, the University of Rochester program plan includes demonstration of a prototype polarization rotator for improved laser beam smoothing and uniformity of target illumination. They will start 24 beam, long-pulse, low-intensity foot-pulse simulation hydrodynamic experiments on OMEGA. They will also demonstrate production of prototype hydrodynamically equivalent polymer shell direct drive targets.

The target fabrication contractor in FY 1991 will continue to be tasked to deliver target components needed for experiments at the program's laboratories. Development of improved target manufacturing methods;

development of new or improved target materials and processes; and development of target characterization technology, all while working with the other program participants, will be part of that support contractor's responsibilities.

STRATEGIC DEFENSE INITIATIVE

Mr. Bevill. What recent information do we have with regard to Soviet progress in the field of Strategic Defense?

Mr. Tuck. *Deleted*

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Mr. Bevill. Please provide an overview of the combined DOD and DOE Strategic Defense program.

Mr. Tuck. The Department of Energy does not have a strategic defense program per se, although DOE's laboratories conduct many nonnuclear research and development programs on a reimbursable basis for the Department of Defense Strategic Defense Initiative Organization.

The objective of the DOD strategic defense initiative, SDI, program is to determine through research, development, and testing the most effective combination of system components that can be integrated into a time-phased nonnuclear strategic defense system. The Strategic Defense System, or SDS, is actually a system of systems. Phase I of the SDS is projected for the mid- to late-1990s based on a Presidential decision to deploy and commensurate Congressional funding. The SDI research program is currently examining the most promising combination of nonnuclear weapons and sensors, along with the requisite battle management and command control and communications elements that would comprise Phase I of the SDS. Optical and radio frequency sensors are being considered, while for weapons, kinetic kill systems such as Lawrence Livermore National Laboratory's Brilliant Pebbles are being examined. Research into advanced concepts for follow-on phases to the SDS is also underway. Emphasis is on advanced sensors and directed energy weapons such as the Free Electron Laser (FEL) being developed for SDI at the Los Alamos National Laboratory.

DOE laboratories are also actively pursuing research on nuclear directed energy weapons. The major objective of the nuclear-directed energy research program is to determine whether the three major concepts being researched--the x-ray laser, the optical frequency laser, and hypervelocity projectiles--are feasible, and if feasible, what threat to the United States current strategic deterrent and future strategic defense forces might be posed should an adversary deploy such systems. The programs I have referred to are good examples of the teamwork between DOD and DOE. Brilliant Pebbles and Free Electron Laser are funded by SDI but have extensive involvement from the DOE laboratories. The nuclear-directed energy research threat assessment program is essentially DOE funded in support of current strategic forces and future defensive system nuclear threat assessment requirements.

STRATEGIC DEFENSE INITIATIVE

Mr. Bevill. Describe the current role of the DOE nuclear program with regard to the overall SDI program. Has the Department's role changed in the last year?

Mr. Tuck. The Department of Energy has three roles that it continues to perform in support of the overall strategic defense initiative program: provide timely assessment of potential nuclear weapon threats to strategic offensive and defensive systems; support space nuclear power research programs; and provide nonnuclear technology research in those areas that the DOE national laboratories have unique expertise.

In the first area, DOE directly funds research programs to determine the technical feasibility of certain nuclear-driven directed energy weapons systems that an adversary might develop and deploy for use against any future United States/allied strategic defense system or against our current strategic deterrent. The United States should be committed to resolving these technical issues in our national defense program so that informed decisions for SDI can be made in a timely manner and survivability of our current deterrent can be assured.

DOE, the National Aeronautics and Space Administration, and the Department of Defense Strategic Defense Initiative Organization have jointly funded research and development on nuclear space power systems. These systems are noted for their long-term survivability and reliability in a space environment.

DOE's basic role of providing support in the above areas to the DOD Strategic Defense Initiative Organization during the last year remains unchanged.

Mr. Bevill. Please describe the status of the DOE Strategic Defense Initiative program and recent accomplishments.

Mr. Tuck. There is no DOE Strategic Defense Initiative program per se. The DOE Nuclear-Directed Energy Weapons (NDEW) program, a threat estimate program, provides some data which may be useful in the SDI program. The NDEW initially investigated six advanced nuclear weapons concepts. Due to fiscal constraints, the program was rescoped to focus on three options: the X-Ray Laser (XRL); Hypervelocity Projectiles; and Optical Frequency Laser (OFL).

For the XRL program, significant scientific and technical advances have been made in the areas of theoretical and computational physics, material chemistry, manufacture and characterization, and laser assembly and alignment. The program is implemented by both theoretical and computational efforts and test experiments.

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In the hypervelocity projectile program, the major laboratory focus last year was on aboveground testing (AGT) to understand the physics

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For the optical frequency laser program, *Deleted*

Again, I want to emphasize that the activities I described are aimed at providing timely assessment of potential nuclear weapons threats to our existing strategic nuclear deterrent, as well as to any defensive system that we may deploy in the future.

Mr. Bevill. What are the DOD and DOE budgets for the Strategic Defense Initiative program in FY 1989, FY 1990, and FY 1991?

Mr. Tuck. As I mentioned previously, the Department of Energy (DOE) does not have a Strategic Defense Initiative program per se. However, since the Nuclear-Directed Energy Weapons, NDEW, threat assessment program may provide some useful threat information to the Strategic Defense Initiative program, I will include the NDEW budget in my answer. I would like to submit for the record the appropriations/requests for the Department of Defense Strategic Defense Initiative program and the DOE NDEW program. (The information follows:)

DOD STRATEGIC DEFENSE INITIATIVES
(IN MILLIONS OF DOLLARS)

	FY 1989 Approp.	FY 1990 Approp.	FY 1991 Request
DOD SDI	$3,710.4	$3,604.7	$4,471.4

DOE NDEW FUNDING
(IN MILLIONS OF DOLLARS)

	FY 1989 Approp.	FY 1990 Approp.	FY 1991 Request
DOE	$ 240.3	$ 214.4	$ 191.9

Mr. Bevill. Which of the SDI concepts under development appear to offer the most promise for the future?

Mr. Tuck. The general question concerning the most promising SDI concepts projected for future systems falls within the purview of the Strategic Defense Initiative Organization at the Department of Defense.

On the nonnuclear side, Brilliant Pebbles, the nonnuclear kinetic energy kill system being developed at the Lawrence Livermore National Laboratory, shows great promise for Phase 1 of the Strategic Defense System. Brilliant Pebbles has the potential of providing an effective defense against Soviet boosters and post-boost vehicles while significantly reducing the overall cost of the Strategic Defense System.

The threat assessment research program on nuclear explosive-driven directed energy weapons being conducted by the Department of Energy, which includes the x-ray laser, optical frequency laser, and the hypervelocity projectile projects, are not at the step of technical feasibility determination to allow selection of the "most promising for the future." Moreover, because of the greatly differing threat implications of each concept on any United States strategic defense system or deterrent force structure, should all three concepts prove viable, the most effective or promising counterdefensive system element would have to be determined through a more comprehensive, future program of analysis and test.

STRATEGIC DEFENSE INITIATIVE

Mr. Bevill. Please provide a detailed listing of all SDI-related activities performed by DOE for FY 1989, FY 1990, and FY 1991. Indicate funding amounts and whether the funds are DOE or DOD appropriations.

Mr. Tuck. The Department of Energy directly funds an assessment of potential strategic nuclear threats in our Nuclear Directed Energy Weapons, NDEW, activities. I will provide funding data for the record. (The information follows:)

Our research on nuclear-power sources is multi-agency funded as noted below. Finally, our SDI-funded reimbursable activities are noted.

DOE-FUNDED NDEW ACTIVITIES
(IN MILLIONS OF DOLLARS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1990 REQUEST
Operating			
X-Ray Laser		*Deleted*	
Hypervelocity Pellets			
Optical Frequency Lasers			
Vulnerability, Lethality, and Countermeasures	6.5	5.1	2.7
Systems Analysis	5.4	3.4	2.1
Subtotal Operating	208.3	181.9	175.7
Capital Equipment	16.8	13.8	11.2
Construction	$ 15.2	$ 18.7	$ 5.0
TOTAL DOE DEFENSE PROGRAMS	$240.3	$214.4	$191.9

DOE/NASA/SDI-FUNDED NUCLEAR POWER SOURCES
(IN MILLIONS OF DOLLARS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1990 REQUEST
SP-100	56.0	29.3	51.0
Multimegawatt	7.0	2.0	3.5
TOTAL NUCLEAR ENERGY PROGRAMS	$ 63.0	$ 31.3	$ 54.5
TOTAL DOE-FUNDED ACTIVITIES	$303.3	$245.7	$246.4

The Department of Defense also transfers Strategic Defense Initiatives funding to DOE directly and through other government agencies and the military services by reimbursable government purchase requests. Historically, DOE has received over 100 of these SDI-related reimbursable purchase requests in each of the last few years. The reimbursable SDI funding received by DOE in FY 1989 was $360 million. Based on this level of funding, it is estimated that the FY 1990 and FY 1991 reimbursable funding will be between $350 and $400 million. Three of the major SDI reimbursable efforts being accomplished by the DOE weapons laboratories are the free electron laser and the neutral particle beam programs sponsored by the Army Strategic Defense Command, and the Brilliant Pebbles kinetic kill interceptor program sponsored by the DOD Strategic Defense Initiatives Organization. The free Electron Laser funding to the Lawrence Livermore and Los Alamos National Laboratories is programmed as *Deleted*

for FEL in FY 1990 and FY 1991 will go primarily to the Los Alamos National Laboratory, LANL, as it, teamed with Boeing, won the Strategic Defense Initiative Organization-sponsored competition over the team of the Lawrence Livermore National Laboratory (LLNL) and TRW. The NPB program at LANL is programmed as *Deleted*

The Brilliant Pebbles program at LLNL is programmed as *Deleted* The remaining activities being conducted by DOE laboratories represent many smaller, individual tasks that are funded between several thousands to several millions of dollars. Historically, these other, smaller efforts have totaled to roughly $200 million in each of the past few years. Specific funding breakouts for each of these smaller programs would have to be provided by the DOD Strategic Defense Initiative Office.

Mr. Bevill. Please describe the planned SDI tests for FY 1991 including the corresponding aspect of SDI which is supported by each test.

Mr. Tuck. The Department of Energy does not conduct SDI tests except as part of its "work for others" program. However, the Nuclear Directed Energy Weapons threat assessment program may provide some useful threat information to the SDI program in this regard. *Deleted*

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Mr. Bevill. Provide a table showing the manpower requirements for all the Strategic Defense Initiative-related activities performed by DOE for FY 1989, FY 1990, and FY 1991. Please provide this by laboratory and indicate whether the manpower is DOE or DOD supported.

Mr. Tuck. I will submit for the record a table showing the manpower requirements for Department of Energy Nuclear-Directed Energy Weapons, NDEW, threat assessment activities that may prove useful to the Strategic Defense Initiative Office at the weapons laboratories. (The information follows:)

MANPOWER LEVELS SUPPORTING NDEW/NUCLEAR AND DOD/SDI REIMBURSABLE PROGRAMS (FULL TIME EQUIVALENTS)

	FY 1989	FY 1990	FY 1991
DOE (Defense Programs and Nuclear Energy) Supported:			
Lawrence Livermore National Laboratory	818	588	578
Los Alamos National Laboratory	443	330	304
Sandia National Laboratories	261	204	193
TOTAL DOE	1,522	1,122	1,075
DOD/SDI (Reimbursable Programs) Supported:*			
Lawrence Livermore National Laboratory	750	700	680
Los Alamos National Laboratory	743	600	530
Sandia National Laboratories	531	614	614
TOTAL DOD	2,024	1,914	1,824

* FY 1991 estimates based upon current plans for continuing work on major projects; e.g., free electron laser.

Mr. Bevill. Provide the funding for all SDI-related activities performed by DOE by location for FY 1989, FY 1990, and FY 1991. Indicate whether the funds are DOE or DOD appropriations.

Mr. Tuck. I will submit for the record a table showing this information. Once again, I want to emphasize that DOE Nuclear-Directed Energy Weapons activities reflected in this table are included only because of the potential threat assessment value to the Strategic Defense Initiative program. (The information follows:)

DOE-FUNDED NDEW THREAT ASSESSMENT RESEARCH ACTIVITIES
(IN MILLIONS OF DOLLARS)

	FY 1989	FY 1990	FY 1991
Lawrence Livermore National Laboratory	$ 87.8	$ 83.5	$ 72.0
Los Alamos National Laboratory	52.2	42.9	42.5
Sandia National Laboratories	40.0	30.1	31.0
Nevada Test Site	59.3	57.0	46.4
Idaho National Engineering Laboratory	1.0	0.9	0
TOTAL DEFENSE PROGRAMS	$240.3	$214.4	$191.9

DOE-FUNDED NUCLEAR ENERGY ACTIVITIES
(IN MILLIONS OF DOLLARS)

Argonne National Laboratory	$ 0.3	$ 0.2	$ 0.1
Energy Technology Engineering Center	0.1	0.1	0.3
Idaho National Engineering Laboratory	1.4	0.2	0.9
Los Alamos National Laboratory	8.4	5.3	6.4
Oak Ridge National Laboratory	2.3	1.9	2.5
Pacific Northwest Laboratory	0.8	0	0
Sandia National Laboratories	0.7	0.3	0.3
Westinghouse Hanford Company	13.3	11.0	19.4
General Electric	31.3	9.7	18.3
General Atomic	2.0	0.7	1.4
Other	2.4	1.9	4.9
TOTAL NUCLEAR ENERGY PROGRAMS	$ 63.0	$ 31.3	$ 54.5

DOD-FUNDED SDI ACTIVITIES PERFORMED BY DOE
(FY 1990/FY 1991 ESTIMATES)
(IN MILLIONS OF DOLLARS)

FY 1989	FY 1990/FY 1991
$ 360	$ 350-400

STRATEGIC DEFENSE INITIATIVE

Mr. Bevill. Provide by location the FY 1989, FY 1990, and FY 1991 funding for X-ray laser, hypervelocity pellets, and optical frequency lasers.

Mr. Tuck. I will submit for the record a table showing this information.

(The information follows:)

NUCLEAR DIRECTED ENERGY WEAPONS RESEARCH
(IN MILLIONS OF DOLLARS)

	FY 1989	FY 1990	FY 1991
X-Ray Laser:			
Lawrence Livermore National Laboratory			
Sandia National Laboratories			
Nevada Test Site			
Los Alamos National Laboratory			
Subtotal			
Hypervelocity Projectiles:			
Los Alamos National Laboratory			
Sandia National Laboratories		*Deleted*	
Nevada Test site			
Subtotal			
Optical Frequency Laser:			
Los Alamos National Laboratory			
Sandia National Laboratories			
Idaho National Engineering Laboratory			
Nevada Test Site			
Subtotal			
OTHER*			
Los Alamos National Laboratory	$ 10.5	$ 8.4	$ 7.1
Lawrence Livermore National Laboratory	16.3	22.0	8.1
Sandia National Laboratories	10.6	5.3	4.4
Nevada Test Site	6.5	5.3	1.4
Subtotal	$ 43.9	$ 41.0	$ 21.0
TOTAL, NDEW Research	$240.3	$214.4	$191.9

* Includes Systems Analysis; Vulnerability, Lethality, and Countermeasures; Capital Equipment; and Construction.

WEAPONS ACTIVITIES

Mr. Bevill. Please provide a breakout by laboratory of DOE funding for FY 1989, FY 1990, and FY 1991.

Mr. Tuck: The laboratory breakout for the Department of Energy Weapons Activities funding for FY 1989, FY 1990, and FY 1991 is shown in a table which I would like to insert in the record. (The information follows:)

LABORATORY WEAPONS ACTIVITIES FUNDING
(IN MILLIONS OF DOLLARS)

	FY 1989	FY 1990	FY 1991
Los Alamos National Laboratory	$ 434.2	$ 468.6	$ 457.5
Lawrence Livermore National Laboratory	441.7	445.9	445.3
Sandia National Laboratories	689.4	672.0	704.6

Mr. Bevill. Please provide a detailed breakout of activities and associated costs funded using DOD funds by individual DOE laboratory for FY 1989, FY 1990, and FY 1991.

Mr. Tuck. The detailed breakout of activities and associated costs using DOD funds is shown in a table which I would like to insert in the record. (The information follows:)

DEPARTMENT OF DEFENSE FUNDED ACTIVITIES
(Dollars in Millions)

	FY 1989	FY 1990	FY 1991
Los Alamos National Laboratory			
Strategic Defense Initiative			
Conventional Defense Technologies		*Deleted*	
Intelligence			
DNA: Central Computing Facility			
Other			
Total	$ 215.0	$ 194.0	$ 191.0
Lawrence Livermore National Laboratory			
Advanced Implementation Tech.	$		
Free Electron Laser Core and Optics			
Charged Particle Beam			
R Program			
Atmospheric Release Advisory Capability Expansion			
Laser Optics Diamond Turning Machine			
SI/Very High Speed Integrated Circuits Projects		*Deleted*	
Solid State Lasers			
Other Air Force			
Other Army			
Other Navy			
Other Defense Nuclear Agency			
Other Defense Advanced Research Projects Agency			
Other Strategic Defense Initiative Office			
Other Department of Defense			
Total	$ 196.0	$ 182.6	$ 222.4
Sandia National Laboratories			
Strategic Defense Initiative	$		
Advanced Military Technology			
Nuclear Weapon Related			
Intelligence			
Verification and Control			
Safeguards and Security			
Survivability			
Components		*Deleted*	
Beam Technology			
Testing			
Other			
Total	$ 235.7	$ 288.0	$ 303.0

RD&T FUNDING

Mr. Bevill. Provide a breakout by location of FY 1989, FY 1990, and FY 1991 funding for: weapons development, engineering and certification; core R&D; and testing capability.

Mr. Tuck. Our Core Research, Development, and Testing (RD&T) program is made up of five elements -- technology base, weapons development, engineering and certification, testing capabilities, special projects, and Marshall Islands activities. I will provide for the record a table that breaks out the Core program into these five elements by location. (The information follows:)

FY 1991 CONGRESSIONAL BUDGET
CORE RD&T PROGRAM
($ IN MILLIONS)

	FY 1989 Approp.	FY 1990 Approp.	FY 1991 Request
Technology Base:			
Lawrence Livermore	$ 146.4	$ 155.2	$ 160.7
Los Alamos	133.1	142.0	131.1
Sandia	115.5	110.6	116.5
Nevada	72.3	59.5	84.8
Other	7.8	7.9	12.3
Subtotal	$ 475.1	$ 475.2	$ 505.4
Weapons Development, Engineering and Certification:			
Livermore	$ 71.2	$ 64.6	$ 65.8
Los Alamos	54.3	53.7	68.4
Sandia	263.1	272.0	278.5
Nevada	53.0	57.7	55.8
Subtotal	$ 441.6	$ 448.0	$ 468.5
Testing Capabilities:			
Livermore	$ 10.7	$ 9.5	$ 10.2
Los Alamos	18.8	16.8	17.8
Sandia	20.4	21.0	21.6
Nevada	125.4	135.4	137.4
Subtotal	$ 175.3	$ 182.7	$ 187.0
Special Projects:			
Livermore	$ 4.6	$ 4.8	$ 6.2
Los Alamos	18.3	26.9	29.5
Sandia	11.4	10.8	12.6
Nevada	17.4	15.7	16.1
Other	18.0	19.0	25.6
Subtotal	$ 69.7	$ 77.2	$ 90.0
Marshall Islands:			
Nevada	$ 4.8	$ 5.3	$ 5.0
TOTAL CORE RD&T PROGRAM	$1,166.5	1,188.4	$1,255.9

New Nuclear Warhead Design and Production

Mr. Bevill: What DOD activities have been accomplished in prior years and are planned to be accomplished in FY 1991 on the carrier systems for the Nuclear Depth/Strike Bomb and the Follow-on to Lance missile warhead?

Dr. Barker. Forty NDSB (B90) development tests have been completed to date on F/A-18, S-3, P-3, and A-6 aircraft as well as basic fit checks on 2 NATO aircraft. During the remainder of FY 1990 and FY 1991 a total of 98 B90 development related engineering tests are planned by the Navy. These activities, along with the interface engineering activities by the Joint Project Officers Group, constitute the DOD accomplishments for the B90. Procurement of the B90 will allow retirement of the B57 bomb first field in 1973.

The Follow-On to Lance missile, to be fired from the M270 Multiple Launch Rocket System (MLRS) platform, is yet to be determined. This determination will be made during the request for proposal (RFP) process. The release of the RFP is estimated for second quarter FY 1990. Therefore, FY 1991 activities would envision initiation of full scale engineering development.

Mr. Bevill. Please update your activities on an earth penetrator warhead and the interim earth penetrator warhead.

Mr. Tuck. The earth penetrator warhead (EPW) program has been divided into two efforts: an interim EPW and a strategic or long term EPW. The requirement for this type of weapon is documented in the Strategic Air Command Statement of Need #002-85 and #009-84.

Progress continues on the interim EPW. *Deleted* *Deleted* The Nuclear Weapons Council voted to proceed with Phase 3. The request letter from the Department of Defense, DOD, to the Department of Energy, DOE, is being coordinated within the DOD. DOE reviewed the Stockpile-to-Target Sequence and Military Characteristics with all DOD and DOE laboratories involved. There are no significant concerns. The DOD/DOE Memorandum of Understanding will be negotiated after Phase 3 has started. As for the airframe, the Air Force has directed the contractor to start work.

Little is being done in the Strategic EPW effort. This Phase 2 project is being led by the Air Force with Navy participation. Studies continue in the area of target vulnerability and characterization, modeling of multi-layered geology, and warhead candidate selection. Many of the organizations involved in the project are waiting to see what happens on the interim EPW before committing additional effort on the strategic EPW.

Mr. Bevill. Please list by fiscal year and phase all weapons and weapons concepts studies in phases 1 through 6.

Mr. Tuck. I will provide that data for the record. (The information follows:)

Warhead program phase dates are shown in Table 1. Phase 1 and Phase 2 weapons are shown in Table 2. In addition, several studies are being supported, as appropriate, including Strategic Relocatable Target, Hypervelocity Glide Vehicle, Maneuvering Reentry Vehicles, Anti-Submarine Warfare, and High Power Microwave Weapon Studies.

TABLE 1

Deleted

TABLE 2

WEAPONS ENTERING PHASES 1-2

	FY 1990	FY 1991
Strategic Earth Penetrator	Phase 2	Phase 2A

Mr. Bevill. The Department is conducting two studies to assure the effectiveness of the nuclear deterrent in the event of underground testing restrictions: the AGEX capabilities study and the warhead remanufacturing substitution study. Please describe each of these and how they fit within the framework of the modernization study.

Mr. Tuck. The Above Ground Experimental, AGEX, capabilities study will survey existing facilities, evaluate ongoing AGEX research activities, and outline needed future AGEX capabilities which will aid in reducing technical and engineering uncertainties in nuclear weapons design processes; help in the development and calibration of diagnostic instrumentation for experiments, and will improve our ability to obtain data from underground tests and develop correlations with the results of these tests and our computer codes and models. The AGEX study will assist in the focus of the modernization study with respect to laboratory research facilities. The remanufacturing/substitution study will determine the feasibility of remanufacturing weapons or using a substitute.

Mr. Bevill. Please provide a chart showing the standard production workload for each year from FY 1980 through FY 1995, and the number of deliveries associated with each year.

Mr. Tuck. The standard production workload, termed the "Equivalent Workload," is provided for the record using the W80 Cruise Missile Warhead as the baseline for determining warhead equivalency. The number of warhead deliveries for the period from FY 1980 through FY 1995 is also provided. (The information follows:)

WARHEAD PRODUCTION

Deleted

TECHNOLOGY TRANSFER PROGRAM

Mr. Bevill. Please describe the technology transfer program included in the weapons research and development budget. What funding was provided for this activity in FY 1989, FY 1990, and FY 1991?

Mr. Tuck. In June 1989, the Acting Assistant Secretary for Defense Programs approved a charter supporting the transfer of Defense Programs (DP) technology to U.S. industry. The enactment of the National Competitiveness Technology Transfer Act of 1989 amended Section 91 of the Atomic Energy Act to emphasize technology transfer as a mission of DP. Responding to this impetus, DP's Technology Management Branch initiated an approach, in concert with other affected DOE elements and under the central coordination of the Office of Policy, Planning, and Analysis, to develop a Departmental strategy for implementing the 1989 legislation.

FY 1990 DP expenditures for technology transfer have been applied to initial guidelines development and to the initiation of three pilot projects with industry. One such project will work with an industry consortium to apply specialty metals technology to commercial uses. The second is working with a group of industries in the transfer of advanced manufacturing techniques. The third technology involves the development of a proliferation-resistant technology for the production of tritium light sources that could be used in expanded commercial and military activities. Continuing DP activities in these areas for FY 1990 will include the formulation of DOE-wide policy and procedure development through the legislative implementation task force established by Deputy Secretary H. Moore on January 31, 1990.

Budget expenditures in FY 1991 will include contributions of personnel and facilities to the two previously mentioned industrial cooperative ventures, and the initiation of a full-scale program to establish technology transfer across all DP activities.

These last efforts will address a wide range of pursuits from the setup and training of a technology transfer infrastructure to the assessment of potential commercialization activities, the active support of industry arrangements for selected projects, and the development of measures for assessing effectiveness of the various efforts.

I would like to insert for the record the breakdown of funding for this activity. (The information follows:)

Funding:

FY 1989 - $550,000 - Office of Classification and Technology Policy budget
FY 1990 - $1,000,000 - Office of Classification and Technology Policy budget
FY 1991 - $10,000,000 - Weapons Research and Development budget

Mr. Bevill. Please list the new technology transfer activities which will be initiated in FY 1991 with the increased funding.

Mr. Tuck. In FY 1991, we will continue to develop policy groundwork for implementing technology transfer in Defense Programs and to develop cooperative agreements between the laboratories and U.S. industry. There will be a significant effort to evaluate project proposals, over 40 have been received already, as well as to implement and monitor existing and new projects. In addition, we will continue the specialty metals processing consortium and the advanced manufacturing technology initiative; assist in promoting a proliferation-resistant tritium light source manufacturing technology; and plan to establish about six more technology transfer projects.

Some examples of new proposals are: industrial applications of copper lasers; ultra precision diamond machining; combustion synthesis of advanced ceramics; package, testing, certification, and design center; and robotic science and technology center.

Mr. Bevill. How will the Department promote technology commercialization of defense-type activities while protecting national security information and minimizing nuclear weapons proliferation?

Mr. Tuck. The Defense Programs technology commercialization program will build upon the Department's existing programs for the protection of classified and sensitive unclassified information. Classification guidelines for the protection of classified information are in place as part of the Department's classification program. We currently have no plans for the transfer of classified technology.

The Office of Classification and Technology Policy, OCTP, in Defense Programs has the charter to develop and implement nuclear export control policy to ensure compliance with U.S. national security and nuclear nonproliferation policy. In this regard, OCTP has been aggressively pursuing measures to control specific technologies that could assist a potential proliferant either directly or indirectly in the design, development, testing, or production of a nuclear explosive device. Guidelines for the protection of Unclassified Controlled Nuclear Information under Section 148 of the Atomic Energy Act have been issued.

With the political transition occurring in Eastern Europe and the Soviet Union, increased pressure has been placed upon the U.S. Government, including DOE, to identify those technologies and commodities which continue to pose a national security concern. In addition, OCIP is involved in a major effort to review and revise international controls, both in the Coordinating Committee on Multilateral Export Controls, COCOM, and under the International Atomic Energy Agency, IAEA, auspices, to ensure that international commerce will not undermine U.S. national security and nonproliferation policy.

LABORATORY-DIRECTED R&D

Mr. Bevill. Please describe the Department's current policy for taxing programs to provide discretionary funding for laboratory-directed R&D. Does the policy differ between weapons laboratories and multi-purpose research laboratories?

Mr. Tuck. The Department's general policy for allowing its multiprogram laboratories to accumulate and expend funds on Laboratory-Directed Research and Development, LDRD, is both desirable and an activity that significantly contributes to the continuing excellence of the laboratories. This general policy is derived from the Department's organic enabling legislation and also Section 303, Public Law 95-39. This general policy is applied equally to the multiprogram laboratories which are under the cognizance of the Assistant Secretary for Defense Programs and those which are under the cognizance of the Director of Energy Research. In 1983, the Department established the

Exploratory Research and Development Program, in order to provide a more structured approach to managing those efforts which represented the majority Laboratory-Directed Research and Development activities. This program also applies equally to both Defense Programs and Energy Research multiprogram laboratories except that the maximum allowable level of activity is established annually and separately for each laboratory by the cognizant secretarial official. This amount need not be the same for all multiprogram laboratories.

The Department has recognized that its general policy has not been uniformly implemented with respect to the basic research portion of the Los Alamos National Laboratory's discretionary funding which was not included in Exploratory Research and Development at the time of its inception, nor has its oversight of these activities been adequate. The Assistant Secretary for Defense Programs, therefore, undertook an extensive study of all Laboratory-Directed Research and Development activities at Defense programs laboratories. The study identified a series of issues needing correction and recommended a policy of management and oversight of all Laboratory-Directed Research and Development activities which would ensure uniform compliance with all Defense Programs and Department-wide orders and regulations. The policy will be implemented shortly.

Mr. Bevill. What amounts are included by program for the discretionary funding of the laboratory directors for FY 1989, FY 1990, and FY 1991? Please describe the source of funds for these discretionary funds. By laboratory, please provide the amount of funding provided and the percentage of total funding allowed for discretionary purposes.

Mr. Tuck. The source of funding for the discretionary funding accounts at Lawrence Livermore and at Los Alamos National Laboratories is a charge assessed to all elements of the laboratories' operating funding, DOE as well as reimbursables. At Livermore that tax is 2 percent in FY 1989, about 3.3 percent in FY 1990, and projected to be about 5 percent in FY 1991. At Los Alamos there are two components of the discretionary account--exploratory research and development, ER&D, and basic research. The ER&D component tax is 2 percent in each fiscal year; the basic research component is 5 percent in FY 1989 and FY 1990 and projected to be 4 percent in FY 1991. Sandia's discretionary account is approximately 1.5 percent of its total operating funding. However, the source of funding at Sandia is a tax of 5 percent against all non-DOE reimbursables. In FY 1989, the Assistant Secretary of Defense Programs, ASDP, allowed each laboratory to spend a maximum of 2 percent of its total operating funding for discretionary ER&D. Also, the ASDP was aware that Los Alamos was spending, at the discretion of the laboratory director, an additional 5 percent of its operating budget for basic research. A policy letter is being drafted to set the total allowable discretionary funding of each laboratory director in FY 1990 to a uniform percentage of the total laboratory operating funding. This percentage will specifically include both ER&D and basic research as components of the discretionary account. I will provide for the record a table which summarizes current and projected discretionary funding at each laboratory. The material follows:

	FY 1989	FY 1990 ($ in Millions)	FY 1991
Lawrence Livermore National Laboratory	$ 18.3	$ 29.9	$ 48.0
Los Alamos National Laboratory			
ER&D	$ 18.5	$ 18.8	$ 19.3
Basic Research	$ 45.8	$ 48.4	$ 39.1
Sandia National Laboratories	$ 13.8	$ 14.9	$ 18.0

LABORATORY DISCRETIONARY ACCOUNTS

Mr. Bevill. Please provide a listing by laboratory of expenditures from the discretionary accounts for FY 1989 and FY 1990 categorized by type of activity.

Mr. Tuck. I will provide that listing for the record. (The information follows:)

LABORATORY-DIRECTED R&D

Mr. Bevill. In response to a May 1989 Inspector General report on "Exploratory R&D Funds at LANL," the acting Assistant Secretary directed a review of laboratory-sponsored R&D. What were the results/recommendations of this report?

Mr. Tuck. At the request of the then Acting Assistant Secretary for Defense Programs, the Deputy Assistant Secretary for Military Application undertook a study on laboratory-directed research and development (R&D). The study was initiated in the summer of 1989, and a draft of the report was completed in December 1989. Among the major findings of the report were a lack of communication between Headquarters and the field offices which created confusion over oversight responsibilities, and that the ASDP does not currently have a structured approach for reviewing and determining appropriate funding levels for laboratory-directed R&D activities. The report recommended a set of policy changes aimed at improving the oversight process of these activities which are currently being implemented.

Mr. Bevill. Please provide the FY 1989, FY 1990, and FY 1991 funding for special projects by location and activity.

Mr. Tuck. I will provide for the record a table showing this information. (The information follows:)

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY-- Exploratory Research and Development (ER&D)	
Atomic and Molecular Physics:	
Los Alamos Bright Source	$ 258
Bright Source Physics: Laboratories	379
Bright Source: Theory	111
Subtotal	748
Biosciences:	
Radionharmaceuticals: Chemical and Biochemical	246
Bio-Mechanical Modeling of Laser Corneal Surgery	93
Precise Measurement of Protein Modulation by 2-D Gel Methods	174
An Information Resource for Molecular Biology Databases	35
Subtotal	548
Chemistry:	
Single Molecule Detection	74
Unusual Valence Chemistry of Transuranics in Extremely Basic and Acidic Media	146
Chemistry of Shocked Energetic Materials	1,323
Subtotal	1,543
Engineering and Base Technologies:	
Investigating Improved Designs in Accelerator Structures	147
Beam Breakup in Coupled-Cavity LINAC	163
Development and Applications of XUV and Compact FELs	208
Research in Chemically Reactive Turbulent Flows	453
Self-Pumped Phase Conjugation Multimode Fiber Interferometer	161
Ring-Jet Formation and Performance	124
Investigation of a New Fluid Pumping Method	145
Basic Properties of Thermographic Phosphors	149
Semiconductor Superlattices for Infrared Applications	197
Infrared Light Scattering From Model Smokes, Obscurants, and Pollutants	11
Microgravity Two Phase Flow Regime Modeling	125
New Generation Low Dose NDT and Industrial Radiography	80
Macrostatistical Hydrodynamics	99
Experimental Identification: Structural Models	204
Subtotal	$ 2,266

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY--ER&D (continued)	
Geosciences, Space Science, and Astrophysics:	
Seismology	$ 127
Modeling of Nuclear Winter and Global Change	312
Continental Scientific Drilling	221
Appl. Blast Waves in Low Thermosphere	78
Oil and Gas Recovery	279
Western Air Quality Study	295
Atmospheric Chemical Carbonaceous Aerosol; Nuclear Winter, and Global Climate Imp.	81
Subtotal	1,393
Materials Science:	
Dynamic Properties of Materials	920
Electrochemical Applications Of Conducting Polymers	130
Stability of Beryllium Alloy Microstructures	99
Chemical Vapor Deposition of Diamond Films	97
Materials Under Extreme Conditions	289
Subtotal	1,535
Computational Science and Mathematics:	
Development of Effective Algorithms for Optimization Over the Symmetric Group	49
Advanced Automatic Control Concepts - Ion Source Control Using ADAPT	146
Applied Mathematics and Mathematical Modeling	502
Models and Applications: Parallel Computation	339
Time Series Signal Analysis with Neural Networks and Related Algorithms	89
Computer Networks	288
Crypto Tech. for Reading Blurred Text	38
Numerical Algorithms for PDE	272
Machine Intelligence	115
Advanced Computing	133
Monte Carlo Methods	133
Systems Analysis Using NORLIK Optimization Code	117
Distributed Parallel Programming Tools	88
Implementation of Atomic Physics in Particle-in-Cell Plasma Simulation	122
Multidimensional Charged Particle Transport Methods	101
Three-Dimensional Free LaGrange	137
Subtotal	$ 2,669

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

LOS ALAMOS NATIONAL LABORATORY--ER&D (continued)

	FY 1989
Plasmas, Fluids and Particle Beams:	
Defense Related Project: Production of Hypervelocities	$ 942
Physics of Nonneutral Plasmas in Traps	80
Instigated Turbulence in Lower Thermosphere	77
Benchmarks in Classical Fluid Instabilities	215
Advanced Methods for Fluid Dynamics	228
An Intense, Pulsed Neutron Source	72
Subtotal	1,614
High Temperature Superconductivity Initiative:	
Solution Routes to Films of and Protective Coatings for HTSC	103
Structure-Function: HTS Materials	51
Spectroscopic Studies: HTSC	98
Material Char. HTSC Devices: Thin Films	243
HTSC By Liquid Phase Epitaxy	95
High TC Oxide Superconductivity	327
Thermodynamic Transport Properties HTS Related Systems	151
Subtotal	1,068
Computer Science Initiative:	
Numerical Laboratory	608
Program Development - XUVFEL:	
XUVFEL	85
Program Development - Energy, Environment, and Industry:	
Hazardous Waste Tech. - Measurement Science: Advanced Inst. Development	250
Hazardous Waste Tech. - Proc. Tech.: H&E Dim. for HTSC Materials	101
Global Change	101
NASP Aero Chemistry Laboratory	420
NASP Combustion Laboratory CFD Modeling	98
Space Tech. - Lunar Soil Simulant	50
Reservoir Production Science	303
Modular High Temperature Gas Reactor	377
MFE: Neutron Source Design Studies	251
Hazardous Waste Technology - Process Technology	75
Subtotal	$ 2,026

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY--ER&D (continued)	
Program Development - Defense:	
BOM (Soft Kill)	$ 141
Neural Net (A)	247
CUI Ceramics (Manufacturing Science)	96
Compact FEL	250
Upconversion Laser (Maritime Warfare)	305
HPM (Soft Kill)	641
Antimaterial	145
Accelerator Production of Tritium (APT)	526
Subtotal	2,351
TOTAL, Los Alamos National Laboratory--ER&D	$18,454

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

LOS ALAMOS NATIONAL LABORATORY--ER&D continued	FY 1990
Atomic and Molecular Physics:	
Atomic Physics at High Energy Density	$ 488
Theoretical Support of the Bright Source	112
Subtotal	600
Biosciences:	
Chemistry and Biochemistry of Radiopharmaceuticals	249
Bio-Mechanical Modeling of Laser Corneal Surgery	91
An Information Resource for Molecular Biology Databases	35
Subtotal	375
Chemistry:	
Unusual Valence Chemistry of Transuranics in Extremely Basic and Acidic Media	145
Chemistry of Shocked Energetic Materials	1,314
Subtotal	1,459
Engineering and Base Technologies:	
Investigating Improved Designs in Accelerator Structures	146
Beam Breakup in Coupled-Cavity LINAC	163
Large-Orbit Gyrotron High-Power Microwave Amplifier	125
Very High-Brightness Electron Beams	371
Study of Enhanced Laser-Materials Interaction Obtained Using Novel Process Methods	250
Development of High-Precision, Short-Period Mag. Undulators for XUV and Compact FELS	210
Thirty-Femtosecond TI: Sapphire Oscillation/Amplifier for Application in Ultrafast	200
High Resolution Measurement of Transient Species Concentration and Their Temp.	175
Chemical Sensors	100
Research in Chemically Reactive Turbulent Flows	450
Self-Pumped Phase Conjugation Multimode Fiber Interferometer	150
Photon Burst Technology for Ultra-High Dynamic Range Measurements	150
Low Pressure High Explosive Equation of State	100
Ring-Jet Formation and Performance	95
Basic Properties of Thermographic Phosphors	146
Electrooptic and Nonlinear Optic Devices Based on Intrinsic Stark Effect	231
Investigation of a New Fluid Pumping Method	146
Semiconductor Superlattices for Infrared Applications	195
New Generation Low-Dose NDT and Industrial Radiography	80
Development and Engineering Application of Nonlinear Signal Processing	140
Experimental Identification of Nonlinear Structural Models	200
Subtotal	$ 3,823

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--ER&D (continued)	
Geosciences, Space Science and Astrophysics:	
Numerical Simulations of Global Climate Change	$ 260
Air Quality Degradation in the Western United States	251
Halogens in the Stratosphere	81
Subtotal	592
Materials Science:	
Microstructural Effects in Shock-Wave Compression	800
Electrochemical Applications of Conducting Polymers	131
Stability of Beryllium Alloy Microstructures	95
Chemical Vapor Deposition of Diamond Films	104
Subtotal	1,130
Computational Science and Mathematics:	
Development of Lie-Poison Integration Techniques	80
Applied Mathematics and Mathematical Modeling	485
Exploring Issues in Design of Multithreaded MIMD Computers	200
Time Series Signal Analysis with Neural Networks and Related Algorithms	65
Adaptive User Interfaces Based on Learning Classified Systems	70
Computer Networks	290
Cryptographic Techniques for Reading Blurred Text	38
Numerical Algorithms for Partial Differential Equations	250
Mathematical and Numerical Analysis of Compressible Materials	150
Neural Networks for Control	146
Advanced Computing	136
Distributed Parallel Programming Tools	88
Implementation of Atomic Physics in Particle-In-Cell Plasma Simulation	127
Multidimensional Charged Particle Transport Methods	102
Three-Dimensional Free LaGrange	127
Subtotal	2,354
Plasmas, Fluids, and Particle Beams:	
Defense Related Project: Production of Hypervelocities	960
Nonneutral Plasma Confinement in Traps	86
Benchmarks in Classical Fluid Instabilities	200
An Intense, Pulsed Neutron Source	68
Subtotal	$ 1,314

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--ER&D (continued)	
High Temperature Superconductivity Initiative:	
Structure-Function Reliability HTC	$ 75
Mar. Char. SC by Thin Film Characterization	250
HTS by Liquid Phase Epitaxy	140
High Tc Oxide Superconductivity	300
Thermodynamic and Transport Properties of HTC	150
Subtotal	915
Computer Science Initiative:	
Numerical Laboratory	600
Program Development - XUVFEL:	
XUVFEL	100
Program Development - Energy, Environment, and Industry:	
Climate Change and Atmospheric Methane	100
Remote Sensing Science	50
H&E Dimension for HTSC Oxide Materials	145
Degradation of Explosives - Plant Cells	100
Plant Suspension Culture Technology	100
Microbial Cleanup Technology	65
Bacterial Degradation of HE, In-Situ	90
Biosequestering of Metal Ions	100
Knowledge Based Systems for Site Closures	75
Supercritical CO_2	75
A High-Temperature/Long-Life Nuclear Fuel	150
Enhancement of In-Situ Vapor Extraction	50
Diagnostic Development for the Aerochemistry Laboratory	200
Zero Gravity Processing of Materials Using the Sheet-Float-Zone Furnace	100
Assessments of Technologies for the Human Space Exploration Initiative	250
Magnetic Fusion Energy Program Development	400
Theoretical and Experimental Analysis of Coal Fired Furnaces and Boilers	200
Subtotal	$ 2,250

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--ER&D (continued)	
Program Development - Defense:	
XUVFEL Lithography System Design and Experiments	$ 400
TEMAS	200
Advanced Neural Network Architectures for Acoustical Transient Detection	250
Development of KOALAS for Intelligent Process Control System Research	225
Filter Occlusion with Surface Polymerizing Agents	125
Upconversion Solid State Lasers	210
SONAR Systems Using Peizopolymers	190
Advanced Materials Manufacturing and Process Control Alliance	500
Hypersonic Vehicle Design Code	125
NASP Aerochemistry Laboratory	275
Antigen-Antibody Detection: Drugs and Chemical Agents	25
Electrooptic and Nonlinear Optics Devices/Intrinsic Stark Effect Sup.	25
Hiding Signals to Noise	25
Electrorheological Fluids	25
Chemical Sensors	25
Bulk Currency Flow Model	25
Battlefield Laser Wavemeter	25
Laser Machining of High Explosives	25
Structural-Hydrodynamic Instabilities	25
Development of Production Codes for the Weapons Effect Community	25
Neutron Imaging Concept	25
Deleted	25
Accelerator Production of Tritium	225
DOE Production Complex Modernization	225
Subtotal	3,250
TOTAL, Los Alamos National Laboratory--ER&D	$18,762

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
SANDIA NATIONAL LABORATORIES	
Chemistry:	
Diagnostics and Modeling of Combustion in Electro-Thermal Devices	$ 309
Immunochemical Recognition of Polymer Surfaces	56
Subtotal	365
Fluid Dynamics:	
ASW Hydrodynamics	585
Supersonic Combustion Research	429
Boundary Layer Transition	137
Subtotal	1,151
Computer Science:	
Real Time Optical Processing	685
Neural Network Computing	725
Automated Finite Element Mesh Generation	494
CAD Directed Automated Programming	518
Subtotal	2,422
Materials Research:	
Diamond Epitaxy	165
Novel Organic Nonlinear Optical Material	203
Protective Coatings for Carbon-Carbon Composites	355
Selective Area Processing of Thin Film Materials	258
Particle Contamination	328
Toxic Plasma Torch	376
Subtotal	1,685
Physics:	
600 KW Average Power, 5-MV Beam Generator	454
Magnetically Insulated Lines Oscillator (MILO) in Constructing a Compact High Power Accelerator	243
Gamma Ray Spectroscopy	96
High Efficiency Textured Surface Quantum Well Detectors	268
Coherence Multiplexing	264
Subtotal	1,325
Sensors:	
Fundamental Properties of Mercuric Iodide X-Ray Sensors	298
Bistatic SAR Study	14
Nonscanning Optical Range Imaging System	217
Subtotal	$ 529

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
SANDIA NATIONAL LABORATORIES (continued)	
Robotics:	
New Telerobotic Control Concepts	$ 371
Design and Control of High-Speed, Flexible Robotic Arm	297
Subtotal	668
Engineering:	
Automated Assembly of Manufactured Parts	168
The Use of Multiple Controlled Sources in Seismological Investigations	248
Technology Development for Tactical Reconnaissance Concept	548
Subtotal	964
Solid State Technology/Devices:	
High Temperature Superconductor Devices	865
Strategies for High-Sensitivity X-Ray Lithography Resists	283
Thin Film Dielectric Processing with a Microwave Plasma	350
Nonvolatile Memories in III-IV Compound Strained Layers Systems	436
Radiation Tolerant, Optically Initiated, High Current Switches	190
Image-Projection Ion Beam Lithography	243
Tunable Optoelectronic and Acoustic Windows and Mirrors	661
Sol-Gel Ferroelectric Thin Films for Nonvolatile Semiconductor Memory Devices	570
Subtotal	3,598
Environmental Science:	
High Temperature Toxic Waste Disposal	1,083
TOTAL, Sandia National Laboratories	$13,790

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
SANDIA NATIONAL LABORATORIES (continued)	
Chemistry:	
Diagnostics and Modeling of Combustion in Electro-Thermal Devices	$ 327
Immunorecognition of Polymer Surfaces for Verification and Tagging	158
High Pressure Diesel Combustion	332
Novel Catalysts Based on Microemulsions	203
Activation and Catalytic Conversion of CO_2	216
Supercritical Combustion	604
Subtotal	1,840
Fluid Dynamics:	
High-Speed Water-Entry Research	295
Supersonic Combustion Research	223
Boundary Layer Transition	189
Subtotal	707
Computer Science:	
Automated Mesh Generation	180
Optical Computing	541
CAD Directed Automated Programming	400
Massive Parallel Computation of Realistic Electronic Structures	230
Nonscanning Optical Range Imaging System	285
Subtotal	1,636
Materials Research:	
Diamond Epitaxy	400
Selective Area Processing of Thin Film Materials	184
Particle Contamination	386
Toxics Plasma Torch	344
Optically Bistable Device Trigonal Tellurium-Selenium Alloys	251
Interfacial Force Microscope	184
Contaminant Transport - Vadose Zone	212
Fragmentation Lethality Modeling for Anti-Armor Warheads	355
Surface Shear Stress Sensors	173
Tl-Based Thin Film Superconductor Devices	501
Subtotal	$ 2,990

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

SANDIA NATIONAL LABORATORIES (continued)

	FY 1990
Physics:	
600 KW Average Power, 5-MV Beam Generator	$ 384
Development of Multi-GHz Resonator Using Periodic Structures	212
Evaluation of an Electrostatic Traveling Wave Accelerator	179
Studies of Neutron-Producing Z Pinches	176
Textured Surface Quantum Well Detectors	264
Coherence Multiplexing	192
Subtotal	1,407
Sensors:	
ATR Control	80
Fiber Optic Micromirror Chemical Sensors for Subsurface Hazardous Chemicals	199
Sensor Development for Systems Application	491
Conformal Coating of Integrated Circuits	416
Modal-Based Target Recognition	176
Optical Pattern Recognition without Imaging	492
Hierarchical Image Processing for High Speed Target Recognition	222
Real-Time Artificial Neural System for Automatic Target Recognition	481
Integrated Optical Waveguides	259
Wake Detection	511
Semiconductor-Based Chemical Sensors	213
Neural Networks for Pattern Recognition and Control	240
Seismic and Electromagnetic Tomography for Tunnel Detection	145
Subtotal	3,925
Robotics:	
Mobile Manipulation	314
Optical Proximity Sensor for Robotics Application	108
A New Concept for Telerobotic Control	310
Design and Control of High-Speed, Flexible Robotic Arms	297
Subtotal	1,029
Solid State Technology/Devices:	
CdTe on III-V Semiconductors for Optoelectronics and Passivation	197
High-Sensitivity X-Ray Lithography Resists	384
Radiation Tolerant Optical Initiated, High Current Switches	175
SOL-GEL PZT Thin Films for Nonvolatile Semiconductor Memory Application	458
Subtotal	$ 1,214

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
SANDIA NATIONAL LABORATORIES (continued)	
Environmental Science:	
Destruction of Hazardous Organic Wastes Using Molten Nitrate Salt Oxides	$ 200
TOTAL, Sandia National Laboratories	$14,948

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LAWRENCE LIVERMORE NATIONAL LABORATORY	
Departmental:	
Biomedical/Environmental Research	$ 300
Chemistry and Materials Science	1,600
Computation Department	700
Earth Sciences Department	200
Energy Program	1,200
Engineering Department (EE and ME)	750
Nuclear Chemistry Division	400
Physics Department	2,200
Subtotal	7,350
Director's Initiatives:	
Accelerator Mass Spectrometry	1,000
Compact Torus	3,000
Crystal Growth Technologies	750
Diode Array Development/Semi-Conductor	850
Gas Gun	800
Hazardous Waste (Subsurface Restoration)	2,000
High Gradient Induction Linac	900
High Resolution Imaging	300
Human Genome	700
Laser Machine	270
Laser Silicon Processing (GILD)	530
Massively Parallel Processing	2,000
Natural Languages	470
Neural Networks	500
Nevada Environmental (NEAR)	860
Plutonium Processing	600
Radar Ocean Imaging (ASW)	300
Scanning Tunnel Microscopy	450
Shaped Isomers	900
Spin Polarization	500
X-Ray Holography	500
X-Ray Lithography	1,000
Subtotal	$19,180

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LAWRENCE LIVERMORE NATIONAL LABORATORY (continued)	
Lab-Wide Competition (27 Awards):	
Biomedical/Environmental Research:	
The Male Genome After Sperm-Egg Fusion: Spatial Distribution of Chromosomal DNA Prior to Embryonic Gene Expression	$ 132
Development of a Unique Biological System for the Remediation of High Explosive Wastes in Environmental Media	180
Development of an Experimental Model of Human Hemopoiesis in Mice	176
Isolation and Characterization of Dioxin Receptor: Development of Anti-Dioxin Receptor Antibody (anti-idiotype) to Basic Problems in Marine Ecology	135
Novel Mammalian Cell Lines Genetically Engineered for Studying Chemical Mutagenesis	162
Fresnel Phase Plates for Intra-Ocular Implants	77
Subtotal	862
Chemistry and Materials Science:	
Modeling the Effect of Pressure on Hydrocarbon Cracking	103
Material Structure During Extremely Short Time Periods	140
Application of Zn-67 Mossbauer Spectroscopy to Hole-Doped and Electron-Doped Copper-Oxide Superconductor	124
Study of Frictional Forces and Wear on Silcon-Based Microdynamic Structures	159
Subtotal	526
Engineering:	
Chlorofluorocarbon Refrigerant Recovery Machine	25
Earth Science:	
Fluid Flow Through Fractures in Rock	136
Fluorescence Sclerochronology: The Chemical and Optical Characterization of Environmental Records in Coral Skeletons	113
Subtotal	$ 249

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LAWRENCE LIVERMORE NATIONAL LABORATORY (continued)	
Physics:	
Construction of a Cyclotron Auto-Resonance Maser (CARM) Experiment Drive by an Induction Linac	$ 170
Lower-Hybrid Current Drive and Hearing with Intense Microwave Pulses	93
Development of an Experimental Method to Produce Dense Plasmas with X-rays	173
Harmonic Generation in Ferroelectric Liquid Crystals and Chiral Polymers	176
A Library of Abundance-Calibration Samples for the Ion Microscope	91
Protron-Neutron Bremsstrahlung at Medium Energies	99
Search for Resonant Sites in Positron-Electron Scattering	191
A Balloon-Borne Hard X-Ray Imaging Telescope for Observations of Cosmic Sources	200
Gamma Rays from the Galactic Center	55
In Situ Characterization of High Tc Superconductors	119
Ab Initio Calculation of Electron Energy Spectra in Very Intense Laser Fields	47
Collision Studies with Very High Charge-State Ions	140
Testing the Inverse Square Law of Gravity on the Bren Tower	60
Proposal to Investigate the Nuclear Physics of Anomalous Electron-Positron-Photon in Low-Energy Heavy-Ion Collisions	94
Subtotal	1,708
TOTAL, Lab-Wide Competition	3,370
TOTAL, Lawrence Livermore National Laboratory	$29,900

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LAWRENCE LIVERMORE NATIONAL LABORATORY	
Departmental:	
Biomedical/Environmental Research	$ 498
Chemistry and Materials Science	1,578
Computation Department	722
Earth Sciences Department	779
Engineering Department (EE and ME)	794
Nuclear Chemistry Division	751
Physics Department	2,369
Subtotal	7,491
Director's Initiatives:	
Accelerator Mass Spectrometry	839
Crystal Growth Technologies	970
Diode Array Development	494
Energy Program	296
High Gradient Induction Linac	790
High Resolution Imaging	790
Human Genome	934
Laser Silicon Processing (GILD)	886
Radar Ocean Imaging (ASW)	345
Spin Polarization	479
X-Ray Holography (Development of)	360
Subtotal	7,183
Lab-Wide Competition (31 Awards):	
Biomedical/Environmental Research:	
NMR Analysis and Molecular Modeling of Protamine Structure and DNA-Protamine Interactions	134
The Application of Accelerator Mass Spectrometry to Basic Problems in Marine Ecology	161
Development of a Unique Biological System for the Remediation of High Explosive Wastes in Environmental Media	141
The Male Genome After Sperm-Egg Fusion: Spatial Distribution of Chromosomal DNA Prior to Embryonic Gene Expression	125
Novel Mammalian Cell Lines Genetically Engineered for Studying Chemical Mutagenesis	135
Haploid Human Sperm Genes and Their Application to Measuring Germinal Mutation Rates: Studies with Transgenic Mice	133
Fresnel Lenses for Intra-Ocular Implants	78
Subtotal	$ 907

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LAWRENCE LIVERMORE NATIONAL LABORATORY	
Chemistry and Materials Science:	
Material Structure During Extremely Short Time Periods	$ 139
Low Pressure Injection of Ceramic Powders for High Density Green Body Formation	100
Subtotal	239
Engineering:	
Miniature Vacuum Tubes for Harsh Environmental Applications	149
Computational Science:	
Monte Carlo Atomic Kinetics Calculations	31
Earth Sciences:	
Pressure Dependence of Sueprconductivity in the Distorted Cu-O Based Perovskites	138
Diagenesis and Sedimentary Brines: A Geochemical Modeling Study	83
Towards the Fastest Gun in the West	180
Accurate Spatial Approximation Schemes for Fluid Dynamics	74
Subtotal	475
Physics:	
Analysis of a Feasibility Experiment for a Cyclotron Auto-Resonance Maser (CARM) Driven by an Induction Linac	176
Lower-Hybrid Current Drive and Hearing with Intense Microwave Pulses	81
Theoretical Studies of Compact Torus Injection for Fueling and Current Drive in Magnetic Fusion Devices	85
A Library of Abundance-Calibration Samples for the Ion Microscope	84
Development of an Experimental Method to Produce Dense Plasmas with X-rays	157
Ultrafast Studies of the Dynamics of Laser-Surface Interactions	78
Chaos in Amplified Spontaneous Emission	65
Soliton Stars: The Upper Stable Mass Limit to Neutron Stars and Supermassive Objects	13
A Test of Newtonian Gravity Using Boreholes and a Tower at the Nevada Test Site	170
Investigate the Nuclear Physics of Anamalous Electron-Photon Production Low Energy Heavy Ion Collisions	91
In Situ Characterization of High Tc Superconductors During Processing	115
Theoretical Study of the Electronics Structure of High Temperature Superconductors	95

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LAWRENCE LIVERMORE NATIONAL LABORATORY (continued)	
The Origin and Growth of Density Fluctuations in the Early Universe and the Nature of the Dark Matter Component of Matter	$ 67
Delta n = 0 Spectroscopy Using Multi-Layer Gratings	174
Search for Resonant States in Positron-Electron Scattering	197
A Balloon-Borne Hard X-Ray Imaging Telescope for Observations of Cosmic Sources	181
Subtotal	1,829
TOTAL, Lab-Wide Competition	3,630
TOTAL, Lawrence Livermore National Laboratories	$18,304

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY-- Basic Research (BR)	
Atomic and Molecular Physics:	
Electron Correlation-Atomic Systems	$ 300
Synchrotron Radiation-Theory	175
Subtotal	475
Biosciences:	
Studies in Molecular Pathology, Protein Glycation and Biological	778
Eleanor Roosevelt Institute for Cancer Research Collaborations	40
Structure-Function Correlates in Signal Peptides	93
Dynamic Model-Human Red Blood Cell	92
Bacterial Toxins; Control of Metabolism and Gene Expression in Symbiosis	124
Neutron Scatter Studies of Transcription Factor TFIIIA Complexes	379
Isolation of DNA Loops	80
High Speed Single Cell Spectrometry	152
Chromatin Structure During Replication	276
Imaging of Neural Activity	141
Modulation-Chromatim Structure by Proteins	207
Hypervariable Sequence Probes for Analysis of the Cytogenetic	236
High Speed DNA Repair Genotyping	72
Novel Fluorescent Probes for Flow Cytometry	179
Interphase Analysis of Aneuploidy via In Situ Hybridization	97
Human Artifical Chromosomes Construction	198
Protein DNA Interactions	128
Neural Networks in Speech Recognition	91
In Vivo Cytotoxic Activities of Immune Cells in Malignant Tumors	107
Synchronization of Human Diploid Fibroblasts	86
Structural Biology	258
Dual Receptor Regulatory Mechanism of Neural Stimulation	163
Structural Biology	82
Polarization Transfer NMR Imaging of Brain Function	138
Mathematical Modeling of AIDS	85
Genetic DB: Machine Learning	95
Theoretical Immunology and Cell Biology	230
The Peripheral Hearing Process	380
Subtotal	$ 4,987

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Chemistry:	
Condensed Phase Chemistry	$ 150
Fundamental Chemistry of Hazardous Waste Destruction	100
Photochemical Investigation with High Intensity Picosecond Infrared Ult.	175
Interfacial Diagnostics	140
Application of Diagnostics Based on Transient Grating Spectroscopy	77
Molecular Spectroscopy of Atmospheric Gases	100
Spectroscopy and Dynamics of High Lying Electronic States	70
Steroselective Ligands as Analytical Reagents	531
Transition Metal Complexes as Models for Hydrogen Uptake	212
Actinide-Main Group Element Chemistry	193
Chemistry of Materials under Extreme Conditions	118
Photodynamics and Energy Conversion by Inorganic Photosystems	94
Electronic Properties of Molecules X82K	55
Dynamics of Molecular Collisions	200
Subtotal	2,215
Engineering and Base Technologies:	
Development of New Fabricatin Method for Superconducting Niobium RF Cav.	350
Nonlinearities of Materials	70
Semiconductor Laser Pumped Visible Solid-State Lasers	200
Chemical Sensors	113
Bright Source	440
Nonlinear Frequency Conversion	80
Scanning Tunneling Microscope Related System	75
Develop System Identification Technology for Non-Linear Dynamic Analysis	122
Advanced Modeling of Hydrogen Assisted Sustained Load Cracking	97
Impulse and Ultrawidth Bandwidth Radar	129
Atomically Engineered Materials	92
Theoretical and Experimental Studies of Nonsteady-State Electron	292
Ultrathin Organic Multilayer Structures	180
Theoretical Study of Some Fundamental Mechanisms Involved Transient	100
Development of FEL Facility for User Experiments	96
Classical vs. Quantum Dynamics: Laser Driven Systems	120
Development of Accelerator Techniques for NDE	142
High Explosives Initiation Study	190
Subtotal	$2,888

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

LOS ALAMOS NATIONAL LABORATORY--BR (continued)	FY 1989
Geosciences, Space Science and Astrophysics:	
Neutron Stars Young and Old - Pulsars	$ 45
S-Band Beat Wave Hearing of the F-Layer	49
Basic Research - Geoscience	229
Develop High Speed General Purpose Data Acquisition	78
Space Plasma Physics	195
Crust-Mantle Studies	341
Astrophysics	274
Lidar Measurement of Boundary Layer Air Mass Movement	100
Iridium Anomalies in Geologic Record	67
Development of Innovative Technique for Study of Cation Exchange in Synth.	76
Flow and Deformation: Mantle, LTHSPHR and Crust	58
Cygnus Gamma Ray Stars	256
High Energy Astrophysics	807
Self Organization in Strong Langmuir Turbulence Excited by HF Heating	60
X+T Divisions Astrophysics Visitors Program	50
Theoretical Astrophysics	304
Astrophysics Visitor Program	39
Subtotal	3,028
Material Science:	
Modeling of Kinetic Processes on Boundary Layers	150
Valence Bands and Low Energy Excitations in Lamellar Oxides	50
Chemistry of Solid Gas Interfaces: Nonlinear Laser Diagnostics	190
Molecular Modifications of Surfaces: Enhanced Tribological Properties	200
Chemical Dynamics of Hydrogen in Metals	150
Interfacial Chemistry and Structure -- Role in Ceramic Materials	350
Low-Dimensional Mixed-Valence Solids	128
USR of High Tc Superconductors	20
In Process Probing of Superconducting and Other Ceramics	228
Neutron Scattering by Actinides and Other Materials	237
Synthesis & Properties of Structural Intermetallic Compounds	180
Synchrotron Radiation Studies/HTSC Materials and 5f Systems	375
Thermal Physics; Rayleigh-Bernard Convection Superfluid	296
IR, Microwave & Optical Spectroscopy of Strongly Correlated Materials	296
Electronic Structure Materials with Strong Electron-Electron Correlations	315
Nonlinear & Novel States of Matter	223
Materails Theory	50
Materials Modeling	50

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Charge Transfer Mechanisms for Superconductivity	$ 60
Stability of High Density Z Pinch	89
Physical Properties of Dense Strongly-Coupled Plasmas	285
Strong Plasma Turbulence Theory	200
Turbulent Multiphase Fluid Flow	128
Advanced Accelerators	164
Thermonuclear Burn Kinetics	78
Subtotal	$ 4,492
Computational Science and Mathematics	
Parallel Network Translation	65
Adaptive User Interfaces	70
High Level Mathematical Software	200
Distributed Supercomputing Scientific Application Hardware ..	130
Statistical Algorithms for Electronic Structure of Condensed Material	167
Special Project	100
Neural Network Model of the Primate Visual System	93
Pade Approximant-Applications Theory Generalizations in Statistical Physics	142
Nonlinear Dynamics of Detonations	50
Numerical Statistical Mechanics of Fluids	115
Towards a New Generation of Adaptive Networks	450
Finite Dimensional & Stochastic Behavior in Nonlinear PDEs ..	240
Lattice Gas Automata	340
Mathematics of Cellular Automata	75
Application of Group Theory to Physical & Mathematical Problems	130
Fracture Modeling by Molecular Dynamics	175
Subtotal	$2,542

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Nuclear and Particle Physics	
Measurement of DBL B Decay 100MO - 100RU Half-Life	$ 163
Study of Fundamental Symmetries Using Neutron Scattering	103
QCD Theory/Glueballs	165
Weak Interaction Physics - NPP	1,084
A Search for Very Rare KL Decays	400
Study of Earth's Gravitational Force on Atomic Particles	1,041
Two-Body Hadronic Decay of Neutral B-Messons & B-Baryon	500
Neutron Physics & Charge-Exchange Reactions	50
Advanced Hardron Physics	385
Lattice QCD and MCRG Research at Los Alamos	75
Scattering Theory & R-Matrix Analysis	40
Nonlinear Field Theory	50
Theoretical Nuclear Spectroscopy	80
Quantum Gravity and the Gravitational Accleration of Antimatter	75
Nuclear Theory	125
Relativistic Heavy-Ion Collisions	100
Research in Elementary Particles & Field Theory	724
Subtotal	5,160
Plasmas, Fluids, and Particle Beams	
Physics and Technology of High Current/High Brightness Accelerators	$ 214

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
High Temperature Superconductivity Initiative:	
Novel Approaches to HTS Thin Films	$ 126
High-Critical Temperature Superconducting Device Theory	96
Electronic Structure Theory of HTSC	194
Synthesis and Characterization of HTS Materials	267
Investigation of Irreversible Flux Motion in HTSC	194
Magnetic Resonance of High Temperature Heavy Fermion Superconductors	98
HTS Theoretical Modeling	194
Phenomenological Theory of High Temperature Superconductors	233
Mixed Valence Properties of HTSC Copper Oxides	200
Theory Studies - HTSC	100
Laser Processing of Superconducting Thin Films	200
Characterization of High-Temperature Superconductors	90
Solidification Structures in Superconducting Ceramics	49
Direct Oxygen Atom Incorporation in HTS Thin Films	150
Phenomenology of High Temperature Superconductors	125
Investigation of Surface Impedance of High Temperature Superconductors	35
Subtotal	2,351
Advanced Computational Laboratory:	750
Institute of Geophysics and Planetary Physics:	1,575
Center for Materials Science:	3,800
Los Alamos Neutron Scattering Center:	
Research	2,400
LANSCE Comm. of Beam Delivery System MP Division	2,100
PSR LANSCE	1,500
Subtotal	6,000
Center for Non-Linear Studies:	2,085
Program Development - Human Genome:	
DNA Base Sequencing	270
Human Genome: Physical Map	180
Robotic Isolation of Recombinant DNA	81
Advanced DNA Sequencing	152
Functional Similarities DNA	120
Human Genome Project, Theoretical and Computational Aspects	186
Subtotal	$ 989

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1989
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Program Development--Advanced Hadron Facility:	
Advanced Hadron Facility Proposal Development	$ 1,493
Comparative Economic Impacts of AHF in Los Alamos and Canada	60
Subtotal	1,553
Program Development--Energy, Environment and Industry:	
Hazardous Waste Tech--Bioreclamation of Toxic Waste	60
Hazardous Waste Tech--Microbial Remediation	90
Hazardous Waste Tech--Plant Cells	100
Removal of BA+2 and Small Organic Explosives from Complex Solutions	55
Subtotal	305
Program Development--Defense:	
Advanced FEL	250
XUV-FEL	100
Subtotal	350
TOTAL, Los Alamos Basic Research	$45,759

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Atomic and Molecular Physics:	
Experimental and Theoretical Investigations of Single- and Multi-Photon Assemblies	$ 125
Electron Correlation in Atomic Systems (Synchrotron Radiation)	300
Theoretical Support of Synchrotron Radiation	175
Subtotal	600
Biosciences:	
Eleanor Roosevelt Institute for Cancer Research Collaborations	20
Structure-Function Correlates in Signal Peptides	93
Higher Order Structure in the Cell Nucleus	176
Neutron Scatter Studies of Transcrip. Factor TFIIIA Complex with its Specific.	379
Can Info on DNA Sequence, Topology and Chromatic Structure be Obtained	200
Cloning the Huntington's Gene	120
Chromatin Structure During Replication	276
Imaging of Neural Activity	141
Modulation of Chromatin Structure by Proteins	207
Megabase DNA Fragment Closing: Application, Functions, and Structural Analysis Complex Genomes	165
Use of Hypervariable Sequence Probes for Analysis of Cytogen. Instab. Accomp. Neoplasia	236
mERCC-5 Repair Gene Deficient Transgenic Mice: Phase 1	184
High Speed DNA Repair Genotyping	72
Novel Fluorescent Probes for Flow Cytometry	179
Interphase Analysis of Aneuploidy via In Situ Hybridization	97
Construction of Human Chromosomes	198
Protein DNA Interactions	128
Synchronization of Human Diploid Fibroblasts	86
High Resolution/High Intensity Small-Angle X-ray Scattering for Biological Research	237
The Dual Receptor Regulatory Mechanism of Neural Stimulation	163
Human Genetic Diversity and Susceptibility to Low Let Radiation	610
Neurophysiological Basis for Magnetoencephalography	250
Polarization Transfer Imaging of Brain Function	138
Theoretical Studies of Structure Stability and Specificity of DNA, Proteins	250
Mathematical Modeling of AIDS	85
Genetic Databases: Applications for Machine Learning	95
Simulation Methods for Long-Time Protein Dynamics and Structure Prediction	50

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Molecular Evolution and the Maturation of the Immune Response	$ 80
The Peripheral Hearing Process--Signal Processing Principles	380
Subtotal	5,295
Chemistry:	
Following Chemical Reactions in Real Time: Experiment and Theory	500
Fundamental Chemistry of Hazardous Waste Destruction	100
Condensed Phase Chemistry	120
Combined X-ray and Neutron Studies of Valence Ordering in Materials	112
Photochemical Invest. with High-Intensity Picosecond Infra. and Ultraviolet Lasers	170
Interfacial Diagnostics	120
Application of Diagnostics Based on Trans. Grating Specs. to Combus. Inhibition Studies	70
Synthesis of New Low-Dimensional Electronic and Nonlinear Optical Materials	100
Transition Metal Complexes as Models for Hydrogen Uptake	212
Actinide-Main Group Element Chemistry	225
Photodynamics and Energy Conversion by Inorganic Photosystems	94
Preorg. Molec. Receptors and Actinides for Environmental Remediation and Waste Minimization	400
Electronic Properties of Molecules	100
Dynamics at the Gas-Solid Interface	100
Subtotal	2,423
Engineering and Base Technologies:	
Nonlinearities of Materials	70
Semiconductor Laser Pumped Visible Solid-State Lasers	200
Scanning Tunneling Microscope Related Systems	75
Advanced Modeling of Hydrogen-Assisted Sustained Load Cracking	109
Ultrathin Organic Multilayer Structures	180
Fundamental Mechanisms in Transient Boiling Hear Transfer	100
Nonlinear Dynamics of Nucleate Boiling Heat Transfer within Framework of Chaos	175
Development of Accelerator Techniques for NDE	142
Subtotal	$ 1,051

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

LOS ALAMOS NATIONAL LABORATORY--BR (continued)

	FY 1990
Geosciences, Space Science and Astrophysics:	
Neutron Stars Young and Old: The 0.5 ms PULSAR in SN 1987A and ms PULSARS Else	$ 71
Geophysical Search for a Violation of Newton's Inverse Square Law	165
Evolution of Continental Lithosphere in Extensional Terrains: 143Nd/144Nd	57
Experimental Study of Oxygen, Nitrogen, and Hydrogen Solubility in Diamond	93
Dynamic Model of the Earth's Radiation Belts	44
Simulation of Pore-Scale Flow Using Cellular Automata (X99j)	95
A Tectonic-Geomorphic Analysis of the Colorado Plateau-Basin and Range Transition	57
Fluid Flow and Solute Transport in Individual Fractures	69
Spectroscopy of Minerals Using Synchrotron Radiation and Inference of Thermal	52
Three-D Mantle Convention with Plate Dynamics	61
Hydrodynamics of Multiphase Flow in Volcanic Conduits	89
U-Th Disequilibrium Geochronology (<1 My) via RIMS	75
Irridium Anomolies in the Geologic Record (X81G)	76
Development of Innovative Technology for the Study of Cation Exchange in Synthetic and Natural Exc.	76
Flow and Deformation in Mantle, Lithosphere, and Crust	58
CYGNUS: Gamma Ray Astronomy with an Extensive Air Shower Array	256
S-Bank Beat Wave Heating of the F-Layer	50
Magnetic Reconnection in the Distant Geomagnetic Tail	45
Simulation and Measurement of Planetary Neutron and Gamma Ray Spectra	85
ESS-Division Astrophysics Visitors Program	35
Nucleosynthesis of the Heavy Metals	55
A New Method for Determining Orientation of Earthquake Slip Planes: Application	77
Elastic Wave Propagation in Heterogeneous Media	50
Gamma-Ray Burst Cyclotron Features: Observations and Theory	90
The Plasma Sheet Boundary Layer: Theory, Simulations and Data Analysis	50
Imaging with Cross Borehole Seismic Data	50
Digital Proportional Counters for X-Ray Astronomy	70
Exploring the Ultrasoft X-Ray Sky via the Alexis Satellite	135
The Dynamics of Ion Reflection at Quasi-Parallel Collisionless Shocks	45
Theoretical Astrophysics	807

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Self-Organization in Strong Langmuir Turbulence Excited by HF Heating of Ion	$ 79
X and T Divisions Theoretical Astrophysics Visitors Pgm.	50
Theoretical Astrophysics	304
Hymns: Hybrid Magnetosphere Numerical Simulations	89
Subtotal	3,560
Materials Sciences:	
Modeling of Kinetic Processes on Boundary Layers	150
Ultra-Fast Optical Probes of Interface Dynamics and Structure	100
Molecular Modification of Surfaces for Enhanced Tribological Properties	200
Interfacial Chemistry and Structure	350
Advanced Studies Program on High-Temperature Superconductivity Theory	353
Center for Microengineered Ceramics	150
Low-Dimensional Mixed-Valence Solids	128
MUON Spin Rotation Studies of High-Temperature Superconductors	20
Metallurgical and Electrical Effects on Interfacial Mechanical Properties of Composite Materials	500
In-Process Probing of Superconducting and Other Ceramics	228
Neutron Scattering by Actinides and Other Materials	237
Synthesis and Properties of Structural Intermetallic Compound Single Crystals	180
Materials by Design for In Situ Chemical Sensor Applications	120
Synchrotron Radiation Studies	375
Optical Spectroscopy of Localized States in Solids	296
Resonant Ultrasound Spectroscopic Investigations of Materials	250
Many-Body Effects in Strongly Correlated Materials	365
Nonlinearity and Novel States of Matter	223
Materials Theory	50
Subtotal	4,275
Mathematics and Computational Sciences:	
Distributed Supercomputing Scientific Application Software	130
Default Hierarchies of Neural Networks for Language Translation	75
High-Level Mathematical Software	200
Statistical Algorithms for Electronic Structure of Condensed Matter	167
Two-D Moving Finite Elements	100

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Classified	$ 100
Neural Network Model of the Primate Visual System	93
The PADE Approximant-Applications, Theory, and Generalizations, and the Stat.	75
High Resolution Multi-Material Hydrodyn. Method for Highly Parallel Computers	80
Nonlinear Dynamics of Detonations	50
Towards a New Generation of Adaptive Networks	450
Mathematical Analysis of Finite-Dimensional and Stochastic Behavior in Nonlinear PDEs	208
New Frontiers for Lattice Gas Methods: Fluids, Superfluids, Dynamical Geom.	200
Computation for Magnetoencephalography	50
Mathematics of Cellular Automata	75
Application of Group Theory to Physical and Mathematical Problems (NEW)	150
Fracture Modeling by Molecular Dynamics	175
Application of Fuzzy Logic and Unsupervised Learning to Process Control	150
Valid Confidence Interval Determination for Standard and Adaptive Monte Carlo Solu.	150
Subtotal	2,678
Nuclear and Particle Physics:	
Measurement of Double Beta Decay in U-238	20
Particle Accelerator Science	215
Sudbury Neutrino Observatory Research	175
Los Alamos Neutron Parity and Time-Reversal-Symmetry Program	50
QCD Theory/Glueballs	48
Antiproton Gravity Interaction	1,048
A Measurement of the Newtonian Gravitation Constant	50
Two-Body Decays of Neutral B-Mesons and b-Baryons	480
Research in Neutrino Physics (X94A)	1,111
Neutron Physics - Charge Exchange Reactions	50
A Search for Rare KAON Decays (X948)	400
Intermediate Energy Physics for a LAMPF Upgrade (AHF First Stage)	417
Lattice QCD, MCRG and Statistical Mechanics	75
Scattering Theory and R Matrix	40
Nonlinear Field Theory	50
DIRAC Nuclear Single-Particle Model	40
Quantum Gravity and the Gravitational Acceleration of Antimatter	75
Relativistic Heavy-Ion Collisions	100
Research in Elementary Particles and Field Theory	724
Subtotal	$5,168

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Plasmas, Fluids, and Particle Beams:	
Plasma Physics Research: Plasma Radiation Processes	$ 260
Plasma Focus - High Currents and Targets	125
Physical Properties of Dense Strongly Coupled Plasmas	285
Nonlinear/nonequilibrium Thermal Physics	200
Investigation of Oscillating Two-Stream Instability Near Rapidly Charged Objects	45
Instigated Turbulence in the Lower Thermosphere	80
Transient Electrical Discharge Theory	71
Simulation of Transport in Magnetized Plasma	50
Strong Plasma Turb. Theory: Application to Laser-Plasmas and Ionispheric Heat. Exp.	200
Turbulent Multiphase Fluid Flow	128
Fluid Vortex Structures in a Rotating Container Heated from Below	80
Hydrodynamics of Materials with Strength, Failure, Fragmentation, and Interpene.	215
Advanced Implicit Plasma Simulation Code Development	100
Thermonuclear Burn Kinetics (X87B)	80
Subtotal	1,919
Undefined Basic Research Projects:	338
High Temperature Superconductivity Initiative:	
Novel Analysis of Thin Films	130
Laser Processing of SC Thin Films	360
Investigation of Irrev. Flux Motion	200
Syn. and Char. of HTS Materials	300
Dep. of Y, Bi, OR Ti-Based SC Thin Films	75
HTS in Large Magnetic Fields	75
Characterization of HTS	100
Dev. Texture HTS/Metal Composites	125
HTS Electrical Development Research	75
Low-Temperature Dep. of Thin Film by Reac. Eva.	40
Nuc. Mag. Research Studies of HTC	120
High Temperature SC Theory	200
Phen. Theory of HTS	350
HTS Materials Theory	100
Mixed Valence Properties of HTS Oxides	200
Undefined	85
Subtotal	2,535
Advanced Computer Lab:	$ 800

DISCRETIONARY ACCOUNT EXPENDITURES
($ IN THOUSANDS)

	FY 1990
LOS ALAMOS NATIONAL LABORATORY--BR (continued)	
Advanced Free Electron Laser Initiative:	
New Fabrication Method for Superconducting Niobium RF Cavities	$ 350
Very High Brightness Electron Beams	848
Development of Free-Electron Laser (FEL) Facility for User Experiments	96
Development of Lie-Poisson Integration Techniques	80
Subtotal	1,374
Institute of Geophysics and Planetary Physics:	1,575
Center for Materials Science:	3,740
Los Alamos Neutron Scattering Center:	
LANSCE Research	2,400
LANSCE Comm of Beam Delivery System MP Div.	2,200
PSR LANSCE	1,533
Subtotal	6,133
Center for Non-Linear Studies:	2,014
Program Development--Human Genome:	
Single Fluorescence Tag Detection	242
Pulsed Field Gel Electrophoretic Analysis of Sorted Human Chromosomes	134
Advanced DNA Sequencing	142
Computer Tools for Physical Mapping	138
Structural Theory of DNA and DNA-Protein Complexes	94
Subtotal	750
Program Development--Intense Hadron Facility:	890
Program Development--SSC Initiative:	
Computer for Supercollider Simulations and Pattern Recognition Studies	100
SSC Initiative	900
Subtotal	1,000
Program Development--Energy, Environment, and Industry:	
Global Change	120
Program Development Defense:	200
TOTAL Los Alamos Basic Research	$48,438

FY 1991 CONGRESSIONAL BUDGET
SPECIAL PROJECTS
(Dollars in Millions)

	FY 1989	FY 1990	FY 1991
Lawrence Livermore			
Detection and Response Cap.	$ 2.0	$ 2.5	$ 2.6
Historically Black Colleges and Universities (HBCU)	0.3	0.4	0.4
Technology Transfer	0	0	1.3
Other	2.3	1.9	1.9
Subtotal	$ 4.6	$ 4.8	$ 6.2
Los Alamos			
Detection & Response Cap.	$ 0.8	$ 2.9	$ 3.1
HBCU	0.5	0.6	0.6
Technology Transfer	0	0	1.3
Tech. Safety Assess. and Asbestos Abatement	0	7.1	7.9
Other	17.0	16.3	16.6
Subtotal	$ 18.3	$ 26.9	$ 29.5
Sandia			
Detection & Response Cap.	$ 2.2	$ 2.0	$ 2.1
HBCU	0.1	0.1	0.1
Technology Transfer	0	0	1.3
Other	9.1	8.7	9.1
Subtotal	$ 11.4	$ 10.8	$ 12.6
Nevada			
Detection & Response Cap.	$ 11.5	$ 13.7	$ 14.4
HBCU	0.1	0.2	0.2
Other	5.8	1.8	1.5
Subtotal	$ 17.4	$ 15.7	$ 16.1
Others			
HBCU	$ 0.2	$ 0.4	$ 0.4
Univ. of California Audit	1.1	0.2	1.6
Technology Transfer	0	0	6.1
Los Alamos Area Office	10.2	10.7	11.0
Other R&D	6.5	7.7	6.5
Subtotal	$ 18.0	$ 19.0	$ 25.6
Total Special Projects	$ 69.7	$ 77.2	$ 90.0

NUCLEAR EMERGENCY SEARCH TEAM

Mr. Bevill. What level of funding was provided for NEST in FY 1989, FY 1990, and FY 1991? What emergencies were responded to in each year?

Mr. Tuck. I will provide that data for the record. (The information follows:)

The level of funding for NEST in FY 1989 was $24.1 million, FY 1990 was $21.4 million, and FY 1991 was $22.2 million. There were no actual emergencies responded to during the period, but four emergency exercises were conducted during that time.

SPECIAL NUCLEAR MATERIALS R&D PROJECT

Mr. Bevill. The total estimated cost of the Special Nuclear Materials Research and Development Laboratory Replacement at Los Alamos has increased significantly and the project is currently being reviewed. Please describe the need for the project, the uncertainties associated with the cost and schedule, and all alternatives available.

Mr. Tuck. The Los Alamos National Laboratory has been conducting plutonium research and development activities at the present Chemistry Metallurgy Research Building since 1952. Over time, it has become more and more difficult and expensive to maintain this facility in a manner compatible with today's more stringent environmental climate. Additionally, the CMR facility is located in the LANL administrative area which has a dense worker population. This new facility will complete the long range plan to locate all Category One plutonium activity at Tech Area 55 where the present plutonium facility 4 is located. It should also be noted that ongoing plutonium research and development, which the new facilities will support, is essential to maintaining the nuclear competence of the weapons program.

With respect to cost and schedule uncertainties, we have completed preliminary engineering for the new facility construction which includes a cost estimate that has been validated by independent cost estimating specialists. There are also additional cost estimates for decontamination and refurbishment of the Chemistry_Metallurgy Research Building. We have less confidence in the estimate for this phase of the project because it is based on advanced conceptual design data. A revised project schedule is also being developed. Achieving this schedule is contingent upon our ability to complete the National Environmental Policy Act activities in a timely manner, as well as our ability to provide the funding needed to keep this project on schedule during a period of tight fiscal constraints. In this regard, it should be noted that, because of the large cost of the Special Nuclear Materials Laboratory compared to the Defense Programs construction budget, a strategy to successfully fund this project must be developed.

Finally, we have identified several alternatives to be considered in the Environmental Impact Statement. These alternatives include siting a new facility at LANL Technical Area 55; major upgrading and refurbishment of the CMR Building; no action except to continue operations in the existing facilities; and siting a new Special Nuclear Materials R&D Laboratory at a LANL location other than Technical Area 55.

ROCKY FLATS RESTART

Mr. Bevill. The budget request is based on the assumption that Rocky Flats will restart on what date? If the plant does not restart by the proposed date, how are weapons deliveries impacted?

Mr. Tuck. No interruption in Rocky Flats activities was anticipated when the budget was prepared. Plutonium operations are now scheduled to be reinitiated in the second quarter of calendar year 1990 with full operations attained by the third quarter of calendar year 1990.

Deleted

STOCKPILE MAINTENANCE ACCOUNT

Mr. Bevill. The number of systems supported in the Stockpile Maintenance account is decreasing while funding requirements continue to increase. What factors are responsible for the increasing costs each year?

Mr. Tuck. The number of warheads in the stockpile is not an accurate indicator of stockpile maintenance funding trends. Stockpile improvement program (SIP) activities for the B61-6, B61-8, and B61-9 programs are funded under the stockpile maintenance category as well as stockpile maintenance activities for weapons currently in stockpile and those that are in or planned for production. The increase in required stockpile maintenance funding is primarily due to increased SIP activity in FY 1992 and FY 1993 which is essential for the incorporation of modern safety and security features in the stockpile.

TRANSPORTATION SAFEGUARDS

Mr. Bevill. Please describe the Department's new Transportation Safeguard Initiative. What is the funding impact of this activity for the outyears through FY 1995?

Mr. Tuck. The Department's new transportation safeguard initiative requires the purchase of 12 new Safe-Secure Trailers, SST's, 30 escort vehicles, associated communications and computers, and hiring and training 66 nuclear material couriers. These additional resources are needed to meet the increased ground transportation requirements to phase out air transport of nuclear weapons in DOE custody which contain conventional high explosive. Our FY 1990 reprogramming request proposes $10.9 million to initiate this effort. Following completion of the initiative in FY 1992, outyear funding would be required only to operate and maintain the SST's.

I will provide the funding of this activity for the outyears for the record. (The information follows:)

TRANSPORTATION SAFEGUARDS OUTYEAR FUNDING

(In Millions of Dollars)

	FY 1992	FY 1993	FY 1994	FY 1995
OPERATING				
Complete Initiative	$ 13.4	$ 0	$ 0	$ 0
Safety Analysis Report	1.5	0	0	0
Couriers/Training/ Travel/Maintenance	5.9	6.5	6.7	6.9
	$ 20.8	$ 6.5	$ 6.7	$ 6.9

Mr. Bevill. Why does funding for Facility Startup/Standby increase significantly in FY 1991?

Mr. Tuck. The increased real growth in this cost category is primarily attributed to the projected costs required to start up Project 86-D-130, Tritium Loading Facility Replacement, Savannah River Plant.

PRODUCTION & SURVEILLANCE MISCELLANEOUS COSTS

Mr. Bevill. Miscellaneous funding in the production and surveillance account increases significantly in FY 1991. Please list the activities along with funding levels included in this account for FY 1989, FY 1990, and FY 1991.

Mr. Tuck. The Miscellaneous cost category includes costs for manpower at our operations and area offices and related services which are funded in the Production and Surveillance decision unit. A listing of Miscellaneous costs is contained in a table I would like to submit for the record. (The information follows:)

WEAPONS PRODUCTION AND SURVEILLANCE
MISCELLANEOUS COSTS
(In Thousands of Dollars)

	FY 1989	FY 1990	FY 1991
Federal Program Management	$ 35,503	$ 40,344	$ 45,934
Management Information Systems	5,600	5,880	6,430
Communications	1,925	2,240	2,700
Accident Response Group	3,389	4,409	4,923
Monsanto Post-Retirement Medical	0	0	23,000
Other	1,165	1,198	1,357
Headquarters-Defense Programs	7,021	7,000	7,400
Total	$ 54,603	$ 61,071	$ 91,744

MARSHALL ISLANDS PROGRAM

Mr. Bevill. Please describe the activities being conducted for the Marshall Island in FY 1990 and FY 1991. Why does funding decrease in FY 1991?

Mr. Tuck. The Department's programs in the Marshall Islands for FY 1990 will continue previous years' activities with two missions to provide medical surveillance and recommend treatment for the 160 remaining exposed people of Rongelap and Utirik; and begin to phase out field work in connection with the environmental program with no field activities scheduled for radiological safety; i.e., bioassay functions.

For FY 1991 the medical program remains unchanged and continues at DOE expense -- no field work, is planned for environmental monitoring or radiological safety unless requested and funded by the Marshalls government. Because of a reduction in field work, our funding requirements are reduced.

WEAPONS TEST PROGRAM

Mr. Bevill. Describe the nuclear weapons test program including for FY 1989, FY 1990, and FY 1991, a list of each test performed, a brief description, the purpose, the weapon system, and the specific program supported by the test.

Mr. Tuck. I would like to provide that data for the record. (The information follows:)

Nuclear tests addressing a wide variety of defense needs are planned in the next several years. The following tables associate the names of these nuclear tests with the primary category to which they are directed. The categories are: TECH - Technology Base, WDEC - Weapon Development, Engineering, and

Certification, NDEW - Nuclear Directed Energy Weapons. Some of these tests have more than one purpose and could be associated, in part, with other categories. The tests listed for FY 1989 and the beginning of FY 1990 have already been conducted. Those listed for the balance of FY 1990 and for FY 1991 are not all certain to occur as planned. Nuclear tests are highly complex scientific experiments and are sometimes deferred for technical reasons, e.g., to redesign hardware to assure the best possible data return, to redesign or even cancel a test due to a discovery in a near term test, etc. The tests for FY 1991, in particular, are still in the planning stages and, as a result, they could change.

DOE Underground Tests

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Mr. Bevill. Please describe the reasons for the U.S. weapons testing program.

Mr. Tuck. Nuclear testing is an essential element of the nation's overall nuclear weapons research and development effort and, thus, is necessary to assure the credibility of the nuclear deterrent. Understanding the complex processes by which nuclear energy is released in a nuclear explosive is critical to our confidence in these weapons systems. This understanding can only come from nuclear tests.

Nuclear tests are conducted to fulfill several basic objectives, among them are to verify that the current stockpile is sound and to discover possible defects or flaws in the performance of these weapons; to develop safe, secure and effective weapons for new military systems needed to maintain the deterrent into the future; to avoid technological surprise by exploring new weapon concepts that could constitute a new threat or could provide significant enhancement to our deterrent capability; to improve our ability to understand and predict the behavior of nuclear weapon systems to permit changes or improvements in nuclear designs that may be needed for an improved deterrent; and to ensure the survivability of weapons and military command, control, communication, and intelligence systems exposed to a hostile nuclear environment.

VASCO ROAD PROJECT

Mr. Bevill. Please describe the status of the Vasco Road project at LLNL.

Mr. Tuck. The Vasco Road project at LLNL includes onsite and offsite improvements. The Safeguards and Security Enhancements, Phase II project scope and cost estimate already includes $500,000 for onsite improvements at LLNL. For offsite improvements, to date $800,000 has been provided for Vasco Road improvements. In FY 1991, we are planning on providing an additional $1.15 million. This will be covered from Laboratory operating funding. Follow-on funding of $1.15 million to complete the project will be requested in FY 1992. DOE supports these improvements which are needed because the main entrance to LLNL has been moved from East Avenue to Vasco Road, significantly altering the traffic pattern. The offsite improvements along Vasco Road are needed for reasons of site security and traffic flow.

GENERAL DEFENSE ACTIVITIES

Mr. Bevill. Please provide by type of vehicle and location a table showing the proposed passenger vehicles to be funded in FY 1991.

Mr. Tuck. The Department plans to purchase 308 passenger motor vehicles in Atomic Energy Defense Activities in FY 1991. All are replacement vehicles, 20 of which are police-type vehicles. I would like to submit for the record a table showing the type of vehicle and location of the vehicles. (The information follows:)

ATOMIC ENERGY DEFENSE ACTIVITIES PROPOSED PASSENGER MOTOR VEHICLES

FY 1991

	Sedans	Station Wagons	Ambulances	Buses	Total
Albuquerque	0	0	1	0	1
Idaho	51	0	0	41	92
Fernald	7	0	0	0	7
Nevada	109	0	0	0	109
Ashtabula Extrusion Plant	7	0	0	0	7
Richland	8	0	0	0	8
Lawrence Livermore National Lab.	41	0	0	0	41
Savannah River	43	0	0	0	43
Total Atomic Energy Defense Activities	266	0	1	41	308
Police-Type (included above)					
Richland	5	0	0	0	0
Savannah River	13	0	0	0	0
Nevada	2	0	0	0	0

Mr. Bevill. Please provide by type of aircraft and location a table showing the inventory of aircraft funded by Atomic Energy Defense Activities.

Mr. Tuck. There were two new aircrafts requested in FY 1991 for replacement--the CESSNA at Albuquerque and a 222B Helicopter at Idaho. I would like to provide for the record a table showing the inventory of aircraft for the Atomic Energy Defense Activities. (The information follows:)

AIRCRAFT

Site/Type of Craft	Number	Location
Albuquerque Operations Office		
Beech Super King Airs	2	Kirtland Air Force Base
DC-9	3	Kirtland Air Force Base
Dehavilland DASH-7	3	Kirtland Air Force Base
Dehavilland Otters	2	Kirtland Air Force Base
Cessna L-19 Single Engine	1	Tonopah
Subtotal, Albuquerque	11	
Chicago Operations Office		
None		
Idaho Operations Office		
222 Bell Helicopters	2	Idaho National Engineering Laboratory 1/
Nevada Operations Offic		
B.O. Helicopter	4	NTS; Las Vegas
B.O. Helicopter	2*	Andrews Air Force Base
Cessna Citation II Twin Engine Jet	1	Las Vegas
Beechcraft King Air 200 Fixed Wing Engine Turbo	2	Las Vegas
Convair 580 Turboprop	1*	Andrews Air Force Base
King Air A 100	1*	Las Vegas
Subtotal, Nevada	11	
Pittsburgh Naval Reactors		
None		
Oak Ridge Operations Office		
None		
Richland Operations Office		
Aerospatiale 350D Helicopters	2	Richland 1/
San Francisco Operations Office (Lawrence Livermore National Laboratory)		
F-27F Turbo-Prop Plane	1	Livermore
Savannah River Operations Office		
MBB BK 117 Twin Engine Helicopter	2	Savannah River Plant 1/
Schenectady Naval Reactors		
None		
Total - All DOE Sites	29	(12 Helicopters; 17 Fixed-Wing Aircraft)

1/ Supports safeguards and security activities.

*/ Denotes aircraft not purchased with Defense Programs funds. Aircraft were obtained through excess or transferred to DOE via other U.S. Government agencies.

Mr. Bevill. Please provide a table showing computer leases and computer procurements for Atomic Energy Defense Activities in FY 1989, FY 1990 and FY 1991.

Mr. Tuck. I will provide the data for the record. (The information follows:)

The following table summaries the computer purchases and computer leases for major computer items.

Atomic Energy Defense Activities
Summary of Computer Purchases and Leases
(In thousands of dollars)

	FY 1989	FY 1990	FY 1991
Computer Purchases			
Research, Development and Testing	$ 28,361	$ 19,200	$ 29,065
Production and Surveillance	15,000	15,450	15,900
Nuclear Materials Production	1,600	3,500	5,500
Waste Transportation and Site Management.	0	0	6,000
Naval Reactors Development	21,600	22,000	16,500
Total - Computer Purchases	$ 66,561	$ 60,150	$ 72,965
Computer Leases			
Research, Development and Testing	$ 23,751	$ 33,761	$ 41,662
Production and Surveillance	5,257	3,759	9,039
Nuclear Materials Production	2,082	2,300	2,300
Waste Transportation and Site Management.	1,797	3,885	7,601
Naval Reactors Development	0	0	0
Total - Computer Leases	$ 32,887	$ 43,705	$ 60,602

Mr. Bevill. Please provide a table showing the environment, safety, and health activities funded by Atomic Energy Defense Activities in FY 1989, FY 1990, and FY 1991. Provide this by site and type of work.

Mr. Tuck. I will supply this information [illegible] the record. (The information follows:)

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DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
FY 1991 CONGRESSIONAL BUDGET
Atomic Energy Defense Only
BUDGET FORMULATION OPS OFFICE/LAB SUMMARY
(Dollars in Thousands)

PAGE NUM		FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
1	ALBUQUERQUE OPERATIONS OFFICE	113,480	152,079	142,189	165,249	178,025	202,083	177,870
	(Operating Expense)	(100,735)	(124,604)	(133,081)	(145,055)	(142,781)	(144,721)	(153,746)
	(Capital Equipment)	(2,985)	(2,625)	(2,999)	(1,344)	(981)	(638)	(1,042)
	(General Plant Projects)	(3,060)	(8,550)	(3,309)	(3,173)	(3,315)	(2,119)	(1,933)
	(Construction)	(6,700)	(16,200)	(2,800)	(15,677)	(30,948)	(54,605)	(21,149)
	(Total Non-Add)	(113,480)	(152,079)	(142,189)	(165,249)	(178,025)	(202,083)	(177,870)
10	CHICAGO OPERATIONS OFFICE	3,815	3,362	3,080	659	618	637	656
	(Operating Expense)	(3,815)	(3,362)	(3,080)	(599)	(618)	(637)	(656)
	(General Plant Projects)	(0)	(0)	(0)	(60)	(0)	(0)	(0)
	(Total Non-Add)	(3,815)	(3,362)	(3,080)	(659)	(618)	(637)	(656)
13	HEADQUARTERS PROGRAM OFFICES	0	1,320	2,540	5,000	2,500	2,000	2,000
	(Operating Expense)	(0)	(1,320)	(2,540)	(5,000)	(2,500)	(2,000)	(2,000)
	(Total Non-Add)	(0)	(1,320)	(2,540)	(5,000)	(2,500)	(2,000)	(2,000)
14	IDAHO OPERATIONS OFFICE	14,379	28,467	31,199	27,700	12,729	9,648	9,448
	(Operating Expense)	(12,809)	(24,267)	(23,778)	(15,610)	(11,029)	(9,648)	(9,448)
	(Capital Equipment)	(850)	(0)	(821)	(90)	(200)	(0)	(0)
	(General Plant Projects)	(720)	(700)	(600)	(0)	(0)	(0)	(0)
	(Construction)	(0)	(3,500)	(6,000)	(12,000)	(1,500)	(0)	(0)
	(Total Non-Add)	(14,379)	(28,467)	(31,199)	(27,700)	(12,729)	(9,648)	(9,448)
17	NEVADA OPERATIONS OFFICE	54,909	63,074	65,864	64,730	63,095	64,230	63,095
	(Operating Expense)	(54,909)	(61,583)	(65,598)	(63,270)	(62,995)	(63,030)	(62,995)
	(Capital Equipment)	(0)	(291)	(266)	(260)	(100)	(200)	(100)
	(General Plant Projects)	(0)	(1,200)	(0)	(1,200)	(0)	(1,000)	(0)
	(Total Non-Add)	(54,909)	(63,074)	(65,864)	(64,730)	(63,095)	(64,230)	(63,095)
18	OAK RIDGE OPERATIONS OFFICE	101,632	109,477	134,266	160,423	126,709	109,203	101,829
	(Operating Expense)	(77,354)	(88,185)	(95,361)	(89,835)	(84,795)	(80,753)	(83,829)
	(Capital Equipment)	(1,835)	(6,915)	(20,705)	(16,345)	(0)	(0)	(0)
	(General Plant Projects)	(1,277)	(2,632)	(2,010)	(2,470)	(1,725)	(2,550)	(0)
	(Construction)	(21,167)	(11,745)	(16,190)	(51,773)	(40,189)	(25,900)	(18,000)
	(Total Non-Add)	(101,633)	(109,477)	(134,266)	(160,423)	(126,709)	(109,203)	(101,829)
22	RICHLAND OPERATIONS OFFICE	56,341	42,957	40,633	24,325	21,536	20,598	19,208
	(Operating Expense)	(55,141)	(41,857)	(37,233)	(24,325)	(21,536)	(20,598)	(19,208)
	(General Plant Projects)	(1,200)	(300)	(900)	(0)	(0)	(0)	(0)
	(Construction)	(0)	(800)	(2,500)	(0)	(0)	(0)	(0)
	(Total Non-Add)	(56,341)	(42,957)	(40,633)	(24,325)	(21,536)	(20,598)	(19,208)

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PAGE NUM		FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
26	SAN FRANCISCO OPERATIONS OFFICE	21,060	19,840	21,034	24,034	46,034	31,034	33,034
	(Operating Expense)	(15,660)	(19,840)	(21,034)	(21,034)	(21,034)	(21,034)	(21,034)
	(Construction)	(5,400)	(0)	(0)	(3,000)	(25,000)	(10,000)	(12,000)
	(Total Non-Add)	(21,060)	(19,840)	(21,034)	(24,034)	(46,034)	(31,034)	(33,034)
27	SAVANNAH RIVER OPERATIONS OFFICE	389,967	426,491	572,930	603,654	623,316	576,163	594,193
	(Operating Expense)	(351,867)	(353,566)	(369,360)	(360,069)	(383,566)	(390,013)	(420,793)
	(Capital Equipment)	(9,700)	(16,325)	(12,500)	(5,435)	(4,800)	(8,750)	(3,300)
	(General Plant Projects)	(1,000)	(900)	(5,420)	(900)	(600)	(0)	(0)
	(Construction)	(27,400)	(55,700)	(185,650)	(237,250)	(234,350)	(177,400)	(170,100)
	(Total Non-Add)	(389,967)	(426,491)	(572,930)	(603,654)	(623,316)	(576,163)	(594,193)
	Total Department of Energy	755,583	847,067	1,013,735	1,075,774	1,074,562	1,015,596	1,001,333
	(Operating Expense)	(672,290)	(718,584)	(751,065)	(724,797)	(730,854)	(732,434)	(773,709)
	(Capital Equipment)	(15,370)	(26,156)	(37,291)	(23,474)	(6,081)	(9,588)	(4,442)
	(General Plant Projects)	(7,257)	(14,382)	(12,239)	(7,803)	(5,640)	(5,669)	(1,933)
	(Construction)	(60,667)	(87,945)	(213,140)	(319,700)	(331,987)	(267,905)	(221,249)
	(Total Non-Add)	(755,584)	(847,067)	(1,013,735)	(1,075,774)	(1,074,562)	(1,015,596)	(1,001,333)

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ALBUQUERQUE OPERATIONS OFFICE
LOS ALAMOS SCIENTIFIC LABORATORY

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	6,474	7,300	8,471	8,934	9,768	10,935	14,062
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	6,940	10,774	12,727	13,696	15,203	16,639	17,236
C. Compliance Activities							
1. Nuclear Reactor	0	0	0	0	217	0	0
2. Nuclear Non-Reactor	0	0	124	290	463	595	1,178
3. Non-Nuclear	0	43	83	332	1,474	2,407	3,211
Subtotal Compliance Activities	0	43	207	622	2,154	3,002	4,389
(Capital Equipment)	(0)	(43)	(83)	(83)	(131)	(88)	(307)
(General Plant Projects)	(0)	(0)	(124)	(373)	(715)	(544)	(1,033)
(Construction)	(0)	(0)	(0)	(166)	(1,308)	(2,370)	(3,049)
(Total Non-Add)	(0)	(43)	(207)	(622)	(2,154)	(3,002)	(4,389)
Total Safety and Health	6,940	10,817	12,934	14,318	17,357	19,641	21,625
(Operating Expense)	(6,940)	(10,774)	(12,727)	(13,696)	(15,203)	(16,639)	(17,236)
(Capital Equipment)	(0)	(43)	(83)	(83)	(131)	(88)	(307)
(General Plant Projects)	(0)	(0)	(124)	(373)	(715)	(544)	(1,033)
(Construction)	(0)	(0)	(0)	(166)	(1,308)	(2,370)	(3,049)
(Total Non-Add)	(6,940)	(10,817)	(12,934)	(14,318)	(17,357)	(19,641)	(21,625)
Total Weapons Activities	13,414	18,117	21,405	23,252	27,125	30,576	35,687
(Operating Expense)	(13,414)	(18,074)	(21,198)	(22,630)	(24,971)	(27,574)	(31,298)
(Capital Equipment)	(0)	(43)	(83)	(83)	(131)	(88)	(307)
(General Plant Projects)	(0)	(0)	(124)	(373)	(715)	(544)	(1,033)
(Construction)	(0)	(0)	(0)	(166)	(1,308)	(2,370)	(3,049)
(Total Non-Add)	(13,414)	(18,117)	(21,405)	(23,252)	(27,125)	(30,576)	(35,687)
TOTAL LOS ALAMOS SCIENTIFIC LABORATORY	13,414	18,117	21,405	23,252	27,125	30,576	35,687
(Operating Expense)	(13,414)	(18,074)	(21,198)	(22,630)	(24,971)	(27,574)	(31,298)
(Capital Equipment)	(0)	(43)	(83)	(83)	(131)	(88)	(307)
(General Plant Projects)	(0)	(0)	(124)	(373)	(715)	(544)	(1,033)
(Construction)	(0)	(0)	(0)	(166)	(1,308)	(2,370)	(3,049)
(Total Non-Add)	(13,414)	(18,117)	(21,405)	(23,252)	(27,125)	(30,576)	(35,687)

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ALBUQUERQUE OPERATIONS OFFICE
ALBUQUERQUE OPERATIONS OFFICE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	3,364	4,598	5,347	5,501	5,660	5,830	6,005
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	3,327	3,379	3,714	3,793	3,881	3,997	4,117
Total Weapons Activities	6,691	7,977	9,061	9,294	9,541	9,827	10,122
(Operating Expense)	(6,691)	(7,977)	(9,061)	(9,294)	(9,541)	(9,827)	(10,122)
(Total Non-Add)	(6,691)	(7,977)	(9,061)	(9,294)	(9,541)	(9,827)	(10,122)
TOTAL ALBUQUERQUE OPERATIONS OFFICE	6,691	7,977	9,061	9,294	9,541	9,827	10,122
(Operating Expense)	(6,691)	(7,977)	(9,061)	(9,294)	(9,541)	(9,827)	(10,122)
(Total Non-Add)	(6,691)	(7,977)	(9,061)	(9,294)	(9,541)	(9,827)	(10,122)

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ALBUQUERQUE OPERATIONS OFFICE
KANSAS CITY PLANT

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	3,791	2,095	4,008	6,264	5,807	6,207	14,299
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	7,776	7,120	6,581	5,228	5,695	5,695	5,750
C. Compliance Activities							
3. Non-Nuclear	2,098	2,976	1,595	7,405	23,690	37,227	2,300
Subtotal Compliance Activities	2,098	2,976	1,595	7,405	23,690	37,227	2,300
(Operating Expense)	(1,250)	(2,000)	(1,270)	(4,359)	(4,150)	(3,892)	(1,400)
(Capital Equipment)	(222)	(36)	(100)	(0)	(300)	(0)	(0)
(General Plant Projects)	(626)	(940)	(225)	(935)	(0)	(0)	(0)
(Construction)	(0)	(0)	(0)	(2,111)	(19,240)	(33,335)	(900)
(Total Non-Add)	(2,098)	(2,976)	(1,595)	(7,405)	(23,690)	(37,227)	(2,300)
Total Safety and Health	9,874	10,096	8,176	12,633	29,385	42,922	8,050
(Operating Expense)	(9,026)	(9,120)	(7,851)	(9,587)	(9,845)	(9,587)	(7,150)
(Capital Equipment)	(222)	(36)	(100)	(0)	(300)	(0)	(0)
(General Plant Projects)	(626)	(940)	(225)	(935)	(0)	(0)	(0)
(Construction)	(0)	(0)	(0)	(2,111)	(19,240)	(33,335)	(900)
(Total Non-Add)	(9,874)	(10,096)	(8,176)	(12,633)	(29,385)	(42,922)	(8,050)
Total Weapons Activities	13,665	12,191	12,184	18,897	35,192	49,129	22,349
(Operating Expense)	(12,817)	(11,215)	(11,859)	(15,851)	(15,652)	(15,794)	(21,449)
(Capital Equipment)	(222)	(36)	(100)	(0)	(300)	(0)	(0)
(General Plant Projects)	(626)	(940)	(225)	(935)	(0)	(0)	(0)
(Construction)	(0)	(0)	(0)	(2,111)	(19,240)	(33,335)	(900)
(Total Non-Add)	(13,665)	(12,191)	(12,184)	(18,897)	(35,192)	(49,129)	(22,349)
TOTAL KANSAS CITY PLANT	13,665	12,191	12,184	18,897	35,192	49,129	22,349
(Operating Expense)	(12,817)	(11,215)	(11,859)	(15,851)	(15,652)	(15,794)	(21,449)
(Capital Equipment)	(222)	(36)	(100)	(0)	(300)	(0)	(0)
(General Plant Projects)	(626)	(940)	(225)	(335)	(0)	(0)	(0)
(Construction)	(0)	(0)	(0)	(2,111)	(19,240)	(33,335)	(900)
(Total Non-Add)	(13,665)	(12,191)	(12,184)	(18,897)	(35,192)	(49,129)	(22,349)

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ALBUQUERQUE OPERATIONS OFFICE
ROCKY FLATS PLANT

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	3,819	4,034	4,193	4,418	4,418	4,418	4,418
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	33,138	40,908	40,987	44,491	43,748	43,395	42,904
C. Compliance Activities							
2. Nuclear Non-Reactor	8,101	17,790	856	310	7,740	17,000	17,200
3. Non-Nuclear	1,390	3,060	3,310	2,265	1,885	1,450	1,450
Subtotal Compliance Activities	9,491	20,850	4,166	2,575	9,625	18,450	18,650
(Operating Expense)	(283)	(143)	(165)	(0)	(0)	(0)	(0)
(Capital Equipment)	(2,268)	(1,897)	(1,241)	(860)	(550)	(550)	(550)
(General Plant Projects)	(2,040)	(6,910)	(2,760)	(1,715)	(1,875)	(900)	(900)
(Construction)	(4,900)	(11,900)	(0)	(0)	(7,200)	(17,000)	(17,200)
(Total Non-Add)	(9,491)	(20,850)	(4,166)	(2,575)	(9,625)	(18,450)	(18,650)
Total Safety and Health	42,629	61,758	45,153	47,066	53,373	61,845	61,554
(Operating Expense)	(33,421)	(41,051)	(41,152)	(44,491)	(43,748)	(43,395)	(42,904)
(Capital Equipment)	(2,268)	(1,897)	(1,241)	(860)	(550)	(550)	(550)
(General Plant Projects)	(2,040)	(6,910)	(2,760)	(1,715)	(1,875)	(900)	(900)
(Construction)	(4,900)	(11,900)	(0)	(0)	(7,200)	(17,000)	(17,200)
(Total Non-Add)	(42,629)	(61,758)	(45,153)	(47,066)	(53,373)	(61,845)	(61,554)
Total Weapons Activities	46,448	65,792	49,346	51,484	57,791	66,263	65,972
(Operating Expense)	(37,240)	(45,085)	(45,345)	(48,909)	(48,166)	(47,813)	(47,322)
(Capital Equipment)	(2,268)	(1,897)	(1,241)	(860)	(550)	(550)	(550)
(General Plant Projects)	(2,040)	(6,910)	(2,760)	(1,715)	(1,875)	(900)	(900)
(Construction)	(4,900)	(11,900)	(0)	(0)	(7,200)	(17,000)	(17,200)
(Total Non-Add)	(46,448)	(65,792)	(49,346)	(51,484)	(57,791)	(66,263)	(65,972)
TOTAL ROCKY FLATS PLANT	46,448	65,792	49,346	51,484	57,791	66,263	65,972
(Operating Expense)	(37,240)	(45,085)	(45,345)	(48,909)	(48,166)	(47,813)	(47,322)
(Capital Equipment)	(2,268)	(1,897)	(1,241)	(860)	(550)	(550)	(550)
(General Plant Projects)	(2,040)	(6,910)	(2,760)	(1,715)	(1,875)	(900)	(900)
(Construction)	(4,900)	(11,900)	(0)	(0)	(7,200)	(17,000)	(17,200)
(Total Non-Add)	(46,448)	(65,792)	(49,346)	(51,484)	(57,791)	(66,263)	(65,972)

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ALBUQUERQUE OPERATIONS OFFICE MOUND LABORATORY	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	1,457	4,019	2,618	3,068	3,389	3,389	3,389
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	7,650	7,337	11,898	14,968	9,003	9,099	9,245
C. Compliance Activities							
3. Non-Nuclear	0	0	2,239	1,715	1,067	1,065	569
Subtotal Compliance Activities	0	0	2,239	1,715	1,067	1,065	569
(Operating Expense)	(0)	(0)	(2,239)	(1,715)	(1,067)	(1,065)	(569)
(Total Non-Add)	(0)	(0)	(2,239)	(1,715)	(1,067)	(1,065)	(569)
Total Safety and Health	7,650	7,337	14,137	16,683	10,070	10,164	9,814
(Operating Expense)	(7,650)	(7,337)	(14,137)	(16,683)	(10,070)	(10,164)	(9,814)
(Total Non-Add)	(7,650)	(7,337)	(14,137)	(16,683)	(10,070)	(10,164)	(9,814)
Total Weapons Activities	9,107	11,356	16,755	19,751	13,459	13,553	13,203
(Operating Expense)	(9,107)	(11,356)	(16,755)	(19,751)	(13,459)	(13,553)	(13,203)
(Total Non-Add)	(9,107)	(11,356)	(16,755)	(19,751)	(13,459)	(13,553)	(13,203)
TOTAL MOUND LABORATORY	9,107	11,356	16,755	19,751	13,459	13,553	13,203
(Operating Expense)	(9,107)	(11,356)	(16,755)	(19,751)	(13,459)	(13,553)	(13,203)
(Total Non-Add)	(9,107)	(11,356)	(16,755)	(19,751)	(13,459)	(13,553)	(13,203)

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ALBUQUERQUE OPERATIONS OFFICE PINELLAS PLANT	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	665	775	995	1,225	1,724	1,502	1,602
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	1,325	3,210	2,660	2,600	3,200	3,200	3,200
Total Weapons Activities	1,990	3,985	3,655	3,825	4,924	4,702	4,802
(Operating Expense)	(1,990)	(3,985)	(3,655)	(3,825)	(4,924)	(4,702)	(4,802)
(Total Non-Add)	(1,990)	(3,985)	(3,655)	(3,825)	(4,924)	(4,702)	(4,802)
TOTAL PINELLAS PLANT	1,990	3,985	3,655	3,825	4,924	4,702	4,802
(Operating Expense)	(1,990)	(3,985)	(3,655)	(3,825)	(4,924)	(4,702)	(4,802)
(Total Non-Add)	(1,990)	(3,985)	(3,655)	(3,825)	(4,924)	(4,702)	(4,802)

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DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
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BUDGET FORMULATION OPS OFFICE/LAB REPORT
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ALBUQUERQUE OPERATIONS OFFICE
PANTEX PLANT

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	760	4,417	1,265	2,718	2,753	1,796	1,939
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	10,893	11,875	14,803	15,459	16,247	17,034	17,858
C. Compliance Activities							
3. Non-Nuclear	3,925	9,225	6,065	14,450	5,425	3,575	0
Subtotal Compliance Activities	3,925	9,225	6,065	14,450	5,425	3,575	0
(Operating Expense)	(2,075)	(4,225)	(3,265)	(1,000)	(1,500)	(1,000)	(0)
(General Plant Projects)	(50)	(700)	(0)	(50)	(725)	(675)	(0)
(Construction)	(1,800)	(4,300)	(2,800)	(13,400)	(3,200)	(1,900)	(0)
(Total Non-Add)	(3,925)	(9,225)	(6,065)	(14,450)	(5,425)	(3,575)	(0)
Total Safety and Health	14,818	21,100	20,868	29,909	21,672	20,609	17,858
(Operating Expense)	(12,968)	(16,100)	(18,068)	(16,459)	(17,747)	(18,034)	(17,858)
(General Plant Projects)	(50)	(700)	(0)	(50)	(725)	(675)	(0)
(Construction)	(1,800)	(4,300)	(2,800)	(13,400)	(3,200)	(1,900)	(0)
(Total Non-Add)	(14,818)	(21,100)	(20,868)	(29,909)	(21,672)	(20,609)	(17,858)
Total Weapons Activities	15,578	25,517	22,133	32,627	24,425	22,405	19,797
(Operating Expense)	(13,728)	(20,517)	(19,333)	(19,177)	(20,500)	(19,830)	(19,797)
(General Plant Projects)	(50)	(700)	(0)	(50)	(725)	(675)	(0)
(Construction)	(1,800)	(4,300)	(2,800)	(13,400)	(3,200)	(1,900)	(0)
(Total Non-Add)	(15,578)	(25,517)	(22,133)	(32,627)	(24,425)	(22,405)	(19,797)
TOTAL PANTEX PLANT	15,578	25,517	22,133	32,627	24,425	22,405	19,797
(Operating Expense)	(13,728)	(20,517)	(19,333)	(19,177)	(20,500)	(19,830)	(19,797)
(General Plant Projects)	(50)	(700)	(0)	(50)	(725)	(675)	(0)
(Construction)	(1,800)	(4,300)	(2,800)	(13,400)	(3,200)	(1,900)	(0)
(Total Non-Add)	(15,578)	(25,517)	(22,133)	(32,627)	(24,425)	(22,405)	(19,797)

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ALBUQUERQUE OPERATIONS OFFICE
SANDIA NATIONAL LAB - ALBUQUERQUE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	450	650	700	700	700	700	700
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	3,400	3,500	3,600	3,700	3,800	3,900	4,000
C. Compliance Activities							
1. Nuclear Reactor	718	1,493	900	375	0	0	0
3. Non-Nuclear	666	402	425	243	143	78	78
Subtotal Compliance Activities	1,384	1,895	1,325	618	143	78	78
(Operating Expense)	(952)	(1,395)	(675)	(318)	(143)	(78)	(78)
(Capital Equipment)	(88)	(400)	(450)	(200)	(0)	(0)	(0)
(General Plant Projects)	(344)	(100)	(200)	(100)	(0)	(0)	(0)
(Total Non-Add)	(1,384)	(1,895)	(1,325)	(618)	(143)	(78)	(78)
Total Safety and Health	4,784	5,395	4,925	4,318	3,943	3,978	4,078
(Operating Expense)	(4,352)	(4,895)	(4,275)	(4,018)	(3,943)	(3,978)	(4,078)
(Capital Equipment)	(88)	(400)	(450)	(200)	(0)	(0)	(0)
(General Plant Projects)	(344)	(100)	(200)	(100)	(0)	(0)	(0)
(Total Non-Add)	(4,784)	(5,395)	(4,925)	(4,318)	(3,943)	(3,978)	(4,078)
Total Weapons Activities	5,234	6,045	5,625	5,018	4,643	4,678	4,778
(Operating Expense)	(4,802)	(5,545)	(4,975)	(4,718)	(4,643)	(4,678)	(4,778)
(Capital Equipment)	(88)	(400)	(450)	(200)	(0)	(0)	(0)
(General Plant Projects)	(344)	(100)	(200)	(100)	(0)	(0)	(0)
(Total Non-Add)	(5,234)	(6,045)	(5,625)	(5,018)	(4,643)	(4,678)	(4,778)
TOTAL SANDIA NATIONAL LAB - ALBUQUERQUE	5,234	6,045	5,625	5,018	4,643	4,678	4,778
(Operating Expense)	(4,802)	(5,545)	(4,975)	(4,718)	(4,643)	(4,678)	(4,778)
(Capital Equipment)	(88)	(400)	(450)	(200)	(0)	(0)	(0)
(General Plant Projects)	(344)	(100)	(200)	(100)	(0)	(0)	(0)
(Total Non-Add)	(5,234)	(6,045)	(5,625)	(5,018)	(4,643)	(4,678)	(4,778)

DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
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ALBUQUERQUE OPERATIONS OFFICE
SANDIA NATIONAL LAB - LIVERMORE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	100	100	100	100	100	100	100
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	750	750	800	800	825	850	875
C. Compliance Activities							
2. Nuclear Non-Reactor	415	249	1,125	201	0	0	185
3. Non-Nuclear	88	0	0	0	0	0	0
Subtotal Compliance Activities	503	249	1,125	201	0	0	185
(Operating Expense)	(96)	(0)	(0)	(0)	(0)	(0)	(0)
(Capital Equipment)	(407)	(249)	(1,125)	(201)	(0)	(0)	(185)
(Total Non-Add)	(503)	(249)	(1,125)	(201)	(0)	(0)	(185)
Total Safety and Health	1,253	999	1,925	1,001	825	850	1,060
(Operating Expense)	(846)	(750)	(800)	(800)	(825)	(850)	(875)
(Capital Equipment)	(407)	(249)	(1,125)	(201)	(0)	(0)	(185)
(Total Non-Add)	(1,253)	(999)	(1,925)	(1,001)	(825)	(850)	(1,060)
Total Weapons Activities	1,353	1,099	2,025	1,101	925	950	1,160
(Operating Expense)	(946)	(850)	(900)	(900)	(925)	(950)	(975)
(Capital Equipment)	(407)	(249)	(1,125)	(201)	(0)	(0)	(185)
(Total Non-Add)	(1,353)	(1,099)	(2,025)	(1,101)	(925)	(950)	(1,160)
TOTAL SANDIA NATIONAL LAB - LIVERMORE	1,353	1,099	2,025	1,101	925	950	1,160
(Operating Expense)	(946)	(850)	(900)	(900)	(925)	(950)	(975)
(Capital Equipment)	(407)	(249)	(1,125)	(201)	(0)	(0)	(185)
(Total Non-Add)	(1,353)	(1,099)	(2,025)	(1,101)	(925)	(950)	(1,160)
TOTAL ALBUQUERQUE OPERATIONS OFFICE	113,480	152,079	142,189	165,249	178,025	202,083	177,870
(Operating Expense)	(100,735)	(124,604)	(133,081)	(145,055)	(142,781)	(144,721)	(153,746)
(Capital Equipment)	(2,985)	(2,625)	(2,999)	(1,344)	(981)	(638)	(1,042)
(General Plant Projects)	(3,060)	(8,650)	(3,309)	(3,173)	(3,315)	(2,119)	(1,933)
(Construction)	(6,700)	(16,200)	(2,800)	(15,677)	(30,948)	(54,605)	(21,149)
(Total Non-Add)	(113,480)	(152,079)	(142,189)	(165,249)	(178,025)	(202,083)	(177,870)

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CHICAGO OPERATIONS OFFICE
ARGONNE NATIONAL LABORATORY

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Materials Production							
I. Environment							
D. Waste Management							
9. Program Support	625	0	0	0	0	0	0
Subtotal Waste Management	625	0	0	0	0	0	0
(Operating Expense)	(625)	(0)	(0)	(0)	(0)	(0)	(0)
(Total Non-Add)	(625)	(0)	(0)	(0)	(0)	(0)	(0)
TOTAL ARGONNE NATIONAL LABORATORY	625	0	0	0	0	0	0
(Operating Expense)	(625)	(0)	(0)	(0)	(0)	(0)	(0)
(Total Non-Add)	(625)	(0)	(0)	(0)	(0)	(0)	(0)

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CHICAGO OPERATIONS OFFICE CHICAGO OPERATIONS OFFICE	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
New Production Reactors							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	2,670	2,800	2,500	0	0	0	0
TOTAL CHICAGO OPERATIONS OFFICE	2,670	2,800	2,500	0	0	0	0
(Operating Expense)	(2,670)	(2,800)	(2,500)	(0)	(0)	(0)	(0)
(Total Non-Add)	(2,670)	(2,800)	(2,500)	(0)	(0)	(0)	(0)

DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
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CHICAGO OPERATIONS OFFICE
NEW BRUNSWICK LABORATORY

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Nuclear Safeguards & Security							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	136	154	159	164	168	172	176
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	384	408	421	435	450	465	480
C. Compliance Activities							
3. Non-Nuclear	0	0	0	60	0	0	0
Subtotal Compliance Activities	0	0	0	60	0	0	0
(General Plant Projects)	(0)	(0)	(0)	(60)	(0)	(0)	(0)
(Total Non-Add)	(0)	(0)	(0)	(60)	(0)	(0)	(0)
Total Safety and Health	384	408	421	495	450	465	480
(Operating Expense)	(384)	(408)	(421)	(435)	(450)	(465)	(480)
(General Plant Projects)	(0)	(0)	(0)	(60)	(0)	(0)	(0)
(Total Non-Add)	(384)	(408)	(421)	(495)	(450)	(465)	(480)
Total Nuclear Safeguards & Security	520	562	580	659	618	637	656
(Operating Expense)	(520)	(562)	(580)	(599)	(618)	(637)	(656)
(General Plant Projects)	(0)	(0)	(0)	(60)	(0)	(0)	(0)
(Total Non-Add)	(520)	(562)	(580)	(659)	(618)	(637)	(656)
TOTAL NEW BRUNSWICK LABORATORY	520	562	580	659	618	637	656
(Operating Expense)	(520)	(562)	(580)	(599)	(618)	(637)	(656)
(General Plant Projects)	(0)	(0)	(0)	(60)	(0)	(0)	(0)
(Total Non-Add)	(520)	(562)	(580)	(659)	(618)	(637)	(656)
TOTAL CHICAGO OPERATIONS OFFICE	3,815	3,362	3,080	659	618	637	656
(Operating Expense)	(3,815)	(3,362)	(3,080)	(599)	(618)	(637)	(656)
(General Plant Projects)	(0)	(0)	(0)	(60)	(0)	(0)	(0)
(Total Non-Add)	(3,815)	(3,362)	(3,080)	(659)	(618)	(637)	(656)

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HEADQUARTERS PROGRAM OFFICES ALL OTHER LABORATORIES/FACILITIES	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES New Production Reactors							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	0	1,320	2,540	5,000	2,500	2,000	2,000
TOTAL ALL OTHER LABORATORIES/FACILITIES	0	1,320	2,540	5,000	2,500	2,000	2,000
(Operating Expense)	(0)	(1,320)	(2,540)	(5,000)	(2,500)	(2,000)	(2,000)
(Total Non-Add)	(0)	(1,320)	(2,540)	(5,000)	(2,500)	(2,000)	(2,000)
TOTAL HEADQUARTERS PROGRAM OFFICES	0	1,320	2,540	5,000	2,500	2,000	2,000
(Operating Expense)	(0)	(1,320)	(2,540)	(5,000)	(2,500)	(2,000)	(2,000)
(Total Non-Add)	(0)	(1,320)	(2,540)	(5,000)	(2,500)	(2,000)	(2,000)

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IDAHO OPERATIONS OFFICE
IDAHO OPERATIONS OFFICE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
New Production Reactors							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	2,500	2,570	1,100	0	0	0	0
TOTAL IDAHO OPERATIONS OFFICE	2,500	2,570	1,100	0	0	0	0
(Operating Expense)	(2,500)	(2,570)	(1,100)	(0)	(0)	(0)	(0)
(Total Non-Add)	(2,500)	(2,570)	(1,100)	(0)	(0)	(0)	(0)

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Environment Safety & Health Reporting System
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IDAHO OPERATIONS OFFICE
IDAHO NATIONAL ENGINEERING LAB - WINCO

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Materials Production							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	2,110	3,189	4,750	5,461	2,036	1,938	1,738
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	8,199	14,298	13,428	10,149	8,993	7,710	7,710
C. Compliance Activities							
3. Non-Nuclear	1,570	8,410	11,921	12,090	1,700	0	0
Subtotal Compliance Activities	1,570	8,410	11,921	12,090	1,700	0	0
(Operating Expense)	(0)	(4,210)	(4,500)	(0)	(0)	(0)	(0)
(Capital Equipment)	(850)	(0)	(821)	(90)	(200)	(0)	(0)
(General Plant Projects)	(720)	(700)	(600)	(0)	(0)	(0)	(0)
(Construction)	(0)	(3,500)	(6,000)	(12,000)	(1,500)	(0)	(0)
(Total Non-Add)	(1,570)	(8,410)	(11,921)	(12,090)	(1,700)	(0)	(0)
Total Safety and Health	9,769	22,708	25,349	22,239	10,693	7,710	7,710
(Operating Expense)	(8,199)	(18,508)	(17,928)	(10,149)	(8,993)	(7,710)	(7,710)
(Capital Equipment)	(850)	(0)	(821)	(90)	(200)	(0)	(0)
(General Plant Projects)	(720)	(700)	(600)	(0)	(0)	(0)	(0)
(Construction)	(0)	(3,500)	(6,000)	(12,000)	(1,500)	(0)	(0)
(Total Non-Add)	(9,769)	(22,708)	(25,349)	(22,239)	(10,693)	(7,710)	(7,710)
Total Materials Production	11,879	25,897	30,099	27,700	12,729	9,648	9,448
(Operating Expense)	(10,309)	(21,697)	(22,678)	(15,610)	(11,029)	(9,648)	(9,448)
(Capital Equipment)	(850)	(0)	(821)	(90)	(200)	(0)	(0)
(General Plant Projects)	(720)	(700)	(600)	(0)	(0)	(0)	(0)
(Construction)	(0)	(3,500)	(6,000)	(12,000)	(1,500)	(0)	(0)
(Total Non-Add)	(11,879)	(25,897)	(30,099)	(27,700)	(12,729)	(9,648)	(9,448)
TOTAL IDAHO NATIONAL ENGINEERING LAB - WINCO	11,879	25,897	30,099	27,700	12,729	9,648	9,448
(Operating Expense)	(10,309)	(21,697)	(22,678)	(15,610)	(11,029)	(9,648)	(9,448)
(Capital Equipment)	(850)	(0)	(821)	(90)	(200)	(0)	(0)
(General Plant Projects)	(720)	(700)	(600)	(0)	(0)	(0)	(0)
(Construction)	(0)	(3,500)	(6,000)	(12,000)	(1,500)	(0)	(0)
(Total Non-Add)	(11,879)	(25,897)	(30,099)	(27,700)	(12,729)	(9,648)	(9,448)

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IDAHO OPERATIONS OFFICE
IDAHO NATIONAL ENGINEERING LAB - EG&G

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Materials Production							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	0	0	0	0	0	0	0
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	0	0	0	0	0	0	0
Total Materials Production	0	0	0	0	0	0	0
TOTAL IDAHO NATIONAL ENGINEERING LAB - EG&G	0	0	0	0	0	0	0
TOTAL IDAHO OPERATIONS OFFICE	14,379	28,467	31,199	27,700	12,729	9,648	9,448
(Operating Expense)	(12,809)	(24,267)	(23,778)	(15,610)	(11,029)	(9,648)	(9,448)
(Capital Equipment)	(850)	(0)	(821)	(90)	(200)	(0)	(0)
(General Plant Projects)	(720)	(700)	(600)	(0)	(0)	(0)	(0)
(Construction)	(0)	(3,500)	(6,000)	(12,000)	(1,500)	(0)	(0)
(Total Non-Add)	(14,379)	(28,467)	(31,199)	(27,700)	(12,729)	(9,648)	(9,448)

DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
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NEVADA OPERATIONS OFFICE
NEVADA OPERATIONS OFFICE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1996 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	20,800	23,752	24,969	24,092	24,620	24,600	24,620
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	33,881	37,546	40,149	38,678	37,875	37,930	37,875
C. Compliance Activities							
2. Nuclear Non-Reactor	0	276	40	60	0	0	0
3. Non-Nuclear	228	1,500	706	1,900	600	1,700	600
Subtotal Compliance Activities	228	1,776	746	1,960	600	1,700	600
(Operating Expense)	(228)	(285)	(480)	(500)	(500)	(500)	(500)
(Capital Equipment)	(0)	(291)	(266)	(260)	(100)	(200)	(100)
(General Plant Projects)	(0)	(1,200)	(0)	(1,200)	(0)	(1,000)	(0)
(Total Non-Add)	(228)	(1,776)	(746)	(1,960)	(600)	(1,700)	(600)
Total Safety and Health	34,109	39,322	40,895	40,638	38,475	39,630	38,475
(Operating Expense)	(34,109)	(37,831)	(40,629)	(39,178)	(38,375)	(38,430)	(38,375)
(Capital Equipment)	(0)	(291)	(266)	(260)	(100)	(200)	(100)
(General Plant Projects)	(0)	(1,200)	(0)	(1,200)	(0)	(1,000)	(0)
(Total Non-Add)	(34,109)	(39,322)	(40,895)	(40,638)	(38,475)	(39,630)	(38,475)
Total Weapons Activities	54,909	63,074	65,864	64,730	63,095	64,230	63,095
(Operating Expense)	(54,909)	(61,583)	(65,598)	(63,270)	(62,995)	(63,030)	(62,995)
(Capital Equipment)	(0)	(291)	(266)	(260)	(100)	(200)	(100)
(General Plant Projects)	(0)	(1,200)	(0)	(1,200)	(0)	(1,000)	(0)
(Total Non-Add)	(54,909)	(63,074)	(65,864)	(64,730)	(63,095)	(64,230)	(63,095)
TOTAL NEVADA OPERATIONS OFFICE	54,909	63,074	65,864	64,730	63,095	64,230	63,095
(Operating Expense)	(54,909)	(61,583)	(65,598)	(63,270)	(62,995)	(63,030)	(62,995)
(Capital Equipment)	(0)	(291)	(266)	(260)	(100)	(200)	(100)
(General Plant Projects)	(0)	(1,200)	(0)	(1,200)	(0)	(1,000)	(0)
(Total Non-Add)	(54,909)	(63,074)	(65,864)	(64,730)	(63,095)	(64,230)	(63,095)
TOTAL NEVADA OPERATIONS OFFICE	54,909	63,074	65,864	64,730	63,095	64,230	63,095
(Operating Expense)	(54,909)	(61,583)	(65,598)	(63,270)	(62,995)	(63,030)	(62,995)
(Capital Equipment)	(0)	(291)	(266)	(260)	(100)	(200)	(100)
(General Plant Projects)	(0)	(1,200)	(0)	(1,200)	(0)	(1,000)	(0)
(Total Non-Add)	(54,909)	(63,074)	(65,864)	(64,730)	(63,095)	(64,230)	(63,095)

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Environment Safety & Health Reporting System
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OAK RIDGE OPERATIONS OFFICE OAK RIDGE NATIONAL LABORATORY	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Materials Production							
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	199	377	422	391	628	634	748
TOTAL OAK RIDGE NATIONAL LABORATORY	199	377	422	391	628	634	748
(Operating Expense)	(199)	(377)	(422)	(391)	(628)	(634)	(748)
(Total Non-Add)	(199)	(377)	(422)	(391)	(628)	(634)	(748)

DEPARTMENT OF ENERGY
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OAK RIDGE OPERATIONS OFFICE
FERNALD FEED MATERIALS PROD. CTR.(WESTINGHOUSE)

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Materials Production							
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	20,907	18,108	27,225	19,332	11,823	5,648	5,675
C. Compliance Activities							
2. Nuclear Non-Reactor	11,865	3,948	2,694	21,618	2,119	590	590
3. Non-Nuclear	4,811	7,662	14,504	181	131	131	131
Subtotal Compliance Activities	16,676	11,610	17,198	21,799	2,250	721	721
(Operating Expense)	(924)	(965)	(1,008)	(721)	(721)	(721)	(721)
(Construction)	(15,753)	(10,645)	(16,190)	(21,078)	(1,529)	(0)	(0)
(Total Non-Add)	(16,677)	(11,610)	(17,198)	(21,799)	(2,250)	(721)	(721)
Total Safety and Health	37,583	29,718	44,423	41,131	14,073	6,369	6,396
(Operating Expense)	(21,831)	(19,073)	(28,233)	(20,053)	(12,544)	(6,369)	(6,396)
(Construction)	(15,753)	(10,645)	(16,190)	(21,078)	(1,529)	(0)	(0)
(Total Non-Add)	(37,584)	(29,718)	(44,423)	(41,131)	(14,073)	(6,369)	(6,396)
TOTAL FERNALD FEED MATERIALS PROD. CTR.(WESTINGHOUSE)	37,583	29,718	44,423	41,131	14,073	6,369	6,396
(Operating Expense)	(21,831)	(19,073)	(28,233)	(20,053)	(12,544)	(6,369)	(6,396)
(Construction)	(15,753)	(10,645)	(16,190)	(21,078)	(1,529)	(0)	(0)
(Total Non-Add)	(37,584)	(29,718)	(44,423)	(41,131)	(14,073)	(6,369)	(6,396)

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OAK RIDGE OPERATIONS OFFICE
Y-12 PLANT

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	18,325	14,649	19,054	19,200	19,200	19,500	20,000
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	24,683	33,163	27,614	30,119	31,686	32,818	34,527
C. Compliance Activities							
2. Nuclear Non-Reactor	8,732	17,988	24,628	33,156	27,297	31,956	30,368
3. Non-Nuclear	8,234	7,292	6,420	25,845	30,460	14,500	6,300
Subtotal Compliance Activities	16,966	25,280	31,048	59,001	57,757	46,456	36,668
(Operating Expense)	(8,919)	(16,923)	(17,888)	(16,766)	(17,372)	(18,006)	(18,668)
(Capital Equipment)	(1,361)	(5,365)	(12,240)	(9,070)	(0)	(0)	(0)
(General Plant Projects)	(1,272)	(1,892)	(920)	(2,470)	(1,725)	(2,550)	(0)
(Construction)	(5,414)	(1,100)	(0)	(30,695)	(38,660)	(25,900)	(18,000)
(Total Non-Add)	(16,966)	(25,280)	(31,048)	(59,001)	(57,757)	(46,456)	(36,668)
Total Safety and Health	41,649	58,443	58,662	89,120	89,443	79,274	71,195
(Operating Expense)	(33,602)	(50,086)	(45,502)	(46,885)	(49,058)	(50,824)	(53,195)
(Capital Equipment)	(1,361)	(5,365)	(12,240)	(9,070)	(0)	(0)	(0)
(General Plant Projects)	(1,272)	(1,892)	(920)	(2,470)	(1,725)	(2,550)	(0)
(Construction)	(5,414)	(1,100)	(0)	(30,695)	(38,660)	(25,900)	(18,000)
(Total Non-Add)	(41,649)	(58,443)	(58,662)	(89,120)	(89,443)	(79,274)	(71,195)
Total Weapons Activities	59,974	73,092	77,716	108,320	108,643	98,774	91,195
(Operating Expense)	(51,927)	(64,735)	(64,556)	(66,085)	(68,258)	(70,324)	(73,195)
(Capital Equipment)	(1,361)	(5,365)	(12,240)	(9,070)	(0)	(0)	(0)
(General Plant Projects)	(1,272)	(1,892)	(920)	(2,470)	(1,725)	(2,550)	(0)
(Construction)	(5,414)	(1,100)	(0)	(30,695)	(38,660)	(25,900)	(18,000)
(Total Non-Add)	(59,974)	(73,092)	(77,716)	(108,320)	(108,643)	(98,774)	(91,195)
Materials Production							
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	1,961	2,000	2,000	2,000	2,000	2,000	2,000

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OAK RIDGE OPERATIONS OFFICE
Y-12 PLANT

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
C. Compliance Activities							
2. Nuclear Non-Reactor	1,915	4,290	9,705	8,581	1,365	1,426	1,490
Subtotal Compliance Activities	1,915	4,290	9,705	8,581	1,365	1,426	1,490
(Operating Expense)	(1,436)	(2,000)	(150)	(1,306)	(1,365)	(1,426)	(1,490)
(Capital Equipment)	(474)	(1,550)	(8,465)	(7,275)	(0)	(0)	(0)
(General Plant Projects)	(5)	(740)	(1,090)	(0)	(0)	(0)	(0)
(Total Non-Add)	(1,915)	(4,290)	(9,705)	(8,581)	(1,365)	(1,426)	(1,490)
Total Safety and Health	3,876	6,290	11,705	10,581	3,365	3,426	3,490
(Operating Expense)	(3,397)	(4,000)	(2,150)	(3,306)	(3,365)	(3,426)	(3,490)
(Capital Equipment)	(474)	(1,550)	(8,465)	(7,275)	(0)	(0)	(0)
(General Plant Projects)	(5)	(740)	(1,090)	(0)	(0)	(0)	(0)
(Total Non-Add)	(3,876)	(6,290)	(11,705)	(10,581)	(3,365)	(3,426)	(3,490)
TOTAL ATOMIC ENERGY DEFENSE ACTIVITIES	63,850	79,382	89,421	118,901	112,008	102,200	94,685
(Operating Expense)	(55,324)	(68,735)	(66,706)	(69,391)	(71,623)	(73,750)	(76,685)
(Capital Equipment)	(1,835)	(6,915)	(20,705)	(16,345)	(0)	(0)	(0)
(General Plant Projects)	(1,277)	(2,632)	(2,010)	(2,470)	(1,725)	(2,550)	(0)
(Construction)	(5,414)	(1,100)	(0)	(30,695)	(38,660)	(25,900)	(18,000)
(Total Non-Add)	(63,850)	(79,382)	(89,421)	(118,901)	(112,008)	(102,200)	(94,685)
TOTAL Y-12 PLANT	63,850	79,382	89,421	118,901	112,008	102,200	94,685
(Operating Expense)	(55,324)	(68,735)	(66,706)	(69,391)	(71,623)	(73,750)	(76,685)
(Capital Equipment)	(1,835)	(6,915)	(20,705)	(16,345)	(0)	(0)	(0)
(General Plant Projects)	(1,277)	(2,632)	(2,010)	(2,470)	(1,725)	(2,550)	(0)
(Construction)	(5,414)	(1,100)	(0)	(30,695)	(38,660)	(25,900)	(18,000)
(Total Non-Add)	(63,850)	(79,382)	(89,421)	(118,901)	(112,008)	(102,200)	(94,685)
TOTAL OAK RIDGE OPERATIONS OFFICE	101,632	109,477	134,266	160,423	126,709	109,203	101,829
(Operating Expense)	(77,354)	(88,185)	(95,361)	(89,835)	(84,795)	(80,753)	(83,829)
(Capital Equipment)	(1,835)	(6,915)	(20,705)	(16,345)	(0)	(0)	(0)
(General Plant Projects)	(1,277)	(2,632)	(2,010)	(2,470)	(1,725)	(2,550)	(0)
(Construction)	(21,167)	(11,745)	(16,190)	(51,773)	(40,189)	(25,900)	(18,000)
(Total Non-Add)	(101,633)	(109,477)	(134,266)	(160,423)	(126,709)	(109,203)	(101,829)

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RICHLAND OPERATIONS OFFICE
RICHLAND OPERATIONS OFFICE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
New Production Reactors							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	2,500	1,900	860	0	0	0	0
TOTAL RICHLAND OPERATIONS OFFICE	2,500	1,900	860	0	0	0	0
(Operating Expense)	(2,500)	(1,900)	(860)	(0)	(0)	(0)	(0)
(Total Non-Add)	(2,500)	(1,900)	(860)	(0)	(0)	(0)	(0)

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RICHLAND OPERATIONS OFFICE
PACIFIC NORTHWEST LABORATORY

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	15	19	18	17	17	17	17
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	5	5	5	5	5	5	5
Total Weapons Activities	20	24	23	22	22	22	22
(Operating Expense)	(20)	(24)	(23)	(22)	(22)	(22)	(22)
(Total Non-Add)	(20)	(24)	(23)	(22)	(22)	(22)	(22)
Materials Production							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	363	464	433	408	408	408	408
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	119	124	128	128	128	128	128
Total Materials Production	482	588	561	536	536	536	536
(Operating Expense)	(482)	(588)	(561)	(536)	(536)	(536)	(536)
(Total Non-Add)	(482)	(588)	(561)	(536)	(536)	(536)	(536)
Nuclear Safeguards & Security							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	27	35	32	30	30	30	30
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	9	9	10	10	10	10	10
Total Nuclear Safeguards & Security	36	44	42	40	40	40	40
(Operating Expense)	(36)	(44)	(42)	(40)	(40)	(40)	(40)
(Total Non-Add)	(36)	(44)	(42)	(40)	(40)	(40)	(40)

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RICHLAND OPERATIONS OFFICE
PACIFIC NORTHWEST LABORATORY

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
TOTAL ATOMIC ENERGY DEFENSE ACTIVITIES	538	656	626	598	598	598	598
(Operating Expense)	(538)	(656)	(626)	(598)	(598)	(598)	(598)
(Total Non-Add)	(538)	(656)	(626)	(598)	(598)	(598)	(598)
TOTAL PACIFIC NORTHWEST LABORATORY	538	656	626	598	598	598	598
(Operating Expense)	(538)	(656)	(626)	(598)	(598)	(598)	(598)
(Total Non-Add)	(538)	(656)	(626)	(598)	(598)	(598)	(598)

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RICHLAND OPERATIONS OFFICE
WESTINGHOUSE HANFORD CO.

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Materials Production							
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	48,992	27,771	23,224	13,989	12,230	11,522	10,132
C. Compliance Activities							
2. Nuclear Non-Reactor	4,311	12,630	15,923	9,738	8,708	8,478	8,478
Subtotal Compliance Activities	4,311	12,630	15,923	9,738	8,708	8,478	8,478
(Operating Expense)	(3,111)	(11,530)	(12,523)	(9,738)	(8,708)	(8,478)	(8,478)
(General Plant Projects)	(1,200)	(300)	(900)	(0)	(0)	(0)	(0)
(Construction)	(0)	(800)	(2,500)	(0)	(0)	(0)	(0)
(Total Non-Add)	(4,311)	(12,630)	(15,923)	(9,738)	(8,708)	(8,478)	(8,478)
Total Safety and Health	53,303	40,401	39,147	23,727	20,938	20,000	18,610
(Operating Expense)	(52,103)	(39,301)	(35,747)	(23,727)	(20,938)	(20,000)	(18,610)
(General Plant Projects)	(1,200)	(300)	(900)	(0)	(0)	(0)	(0)
(Construction)	(0)	(800)	(2,500)	(0)	(0)	(0)	(0)
(Total Non-Add)	(53,303)	(40,401)	(39,147)	(23,727)	(20,938)	(20,000)	(18,610)
TOTAL WESTINGHOUSE HANFORD CO.	53,303	40,401	39,147	23,727	20,938	20,000	18,610
(Operating Expense)	(52,103)	(39,301)	(35,747)	(23,727)	(20,938)	(20,000)	(18,610)
(General Plant Projects)	(1,200)	(300)	(900)	(0)	(0)	(0)	(0)
(Construction)	(0)	(800)	(2,500)	(0)	(0)	(0)	(0)
(Total Non-Add)	(53,303)	(40,401)	(39,147)	(23,727)	(20,938)	(20,000)	(18,610)
TOTAL RICHLAND OPERATIONS OFFICE	56,341	42,957	40,633	24,325	21,536	20,598	19,208
(Operating Expense)	(55,141)	(41,857)	(37,233)	(24,325)	(21,536)	(20,598)	(19,208)
(General Plant Projects)	(1,200)	(300)	(900)	(0)	(0)	(0)	(0)
(Construction)	(0)	(800)	(2,500)	(0)	(0)	(0)	(0)
(Total Non-Add)	(56,341)	(42,957)	(40,633)	(24,325)	(21,536)	(20,598)	(19,208)

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SAN FRANCISCO OPERATIONS OFFICE
LAWRENCE LIVERMORE LABORATORY

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	4,688	6,597	6,982	6,982	6,982	6,982	6,982
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	10,972	13,243	14,052	14,052	14,052	14,052	14,052
C. Compliance Activities							
2. Nuclear Non-Reactor	0	0	0	0	3,000	0	0
3. Non-Nuclear	5,400	0	0	3,000	22,000	10,000	12,000
Subtotal Compliance Activities	5,400	0	0	3,000	25,000	10,000	12,000
(Construction)	(5,400)	(0)	(0)	(3,000)	(25,000)	(10,000)	(12,000)
(Total Non-Add)	(5,400)	(0)	(0)	(3,000)	(25,000)	(10,000)	(12,000)
Total Safety and Health	16,372	13,243	14,052	17,052	39,052	24,052	26,052
(Operating Expense)	(10,972)	(13,243)	(14,052)	(14,052)	(14,052)	(14,052)	(14,052)
(Construction)	(5,400)	(0)	(0)	(3,000)	(25,000)	(10,000)	(12,000)
(Total Non-Add)	(16,372)	(13,243)	(14,052)	(17,052)	(39,052)	(24,052)	(26,052)
Total Weapons Activities	21,060	19,840	21,034	24,034	46,034	31,034	33,034
(Operating Expense)	(15,660)	(19,840)	(21,034)	(21,034)	(21,034)	(21,034)	(21,034)
(Construction)	(5,400)	(0)	(0)	(3,000)	(25,000)	(10,000)	(12,000)
(Total Non-Add)	(21,060)	(19,840)	(21,034)	(24,034)	(46,034)	(31,034)	(33,034)
TOTAL LAWRENCE LIVERMORE LABORATORY	21,060	19,840	21,034	24,034	46,034	31,034	33,034
(Operating Expense)	(15,660)	(19,840)	(21,034)	(21,034)	(21,034)	(21,034)	(21,034)
(Construction)	(5,400)	(0)	(0)	(3,000)	(25,000)	(10,000)	(12,000)
(Total Non-Add)	(21,060)	(19,840)	(21,034)	(24,034)	(46,034)	(31,034)	(33,034)
TOTAL SAN FRANCISCO OPERATIONS OFFICE	21,060	19,840	21,034	24,034	46,034	31,034	33,034
(Operating Expense)	(15,660)	(19,840)	(21,034)	(21,034)	(21,034)	(21,034)	(21,034)
(Construction)	(5,400)	(0)	(0)	(3,000)	(25,000)	(10,000)	(12,000)
(Total Non-Add)	(21,060)	(19,840)	(21,034)	(24,034)	(46,034)	(31,034)	(33,034)

DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
FY 1991 CONGRESSIONAL BUDGET
Atomic Energy Defense Only
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(Dollars in Thousands)

SAVANNAH RIVER OPERATIONS OFFICE
SAVANNAH RIVER OPERATIONS OFFICE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
ATOMIC ENERGY DEFENSE ACTIVITIES							
Weapons Activities							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	1,169	1,052	1,110	1,138	1,172	1,214	1,261
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	4,252	3,807	3,926	4,015	4,278	4,433	4,589
C. Compliance Activities							
2. Nuclear Non-Reactor	20	231	17	13	0	6	0
3. Non-Nuclear	4	1	4	5	5	5	5
Subtotal Compliance Activities	24	232	21	18	5	11	5
(Operating Expense)	(24)	(27)	(21)	(18)	(5)	(11)	(5)
(Capital Equipment)	(0)	(205)	(0)	(0)	(0)	(0)	(0)
(Total Non-Add)	(24)	(232)	(21)	(18)	(5)	(11)	(5)
Total Safety and Health	4,276	4,039	3,947	4,033	4,283	4,444	4,594
(Operating Expense)	(4,276)	(3,834)	(3,947)	(4,033)	(4,283)	(4,444)	(4,594)
(Capital Equipment)	(0)	(205)	(0)	(0)	(0)	(0)	(0)
(Total Non-Add)	(4,276)	(4,039)	(3,947)	(4,033)	(4,283)	(4,444)	(4,594)
Total Weapons Activities	5,445	5,091	5,057	5,171	5,455	5,658	5,855
(Operating Expense)	(5,445)	(4,886)	(5,057)	(5,171)	(5,455)	(5,658)	(5,855)
(Capital Equipment)	(0)	(205)	(0)	(0)	(0)	(0)	(0)
(Total Non-Add)	(5,445)	(5,091)	(5,057)	(5,171)	(5,455)	(5,658)	(5,855)
Materials Production							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	71,242	80,948	98,949	80,767	96,386	95,683	119,147
II. Safety and Health							
A. Base Activity (OE)							
1. Base Activity	254,601	253,941	254,554	266,542	275,416	282,169	292,969
C. Compliance Activities							
1. Nuclear Reactor	52,878	67,284	163,819	205,623	170,694	91,383	73,541
2. Nuclear Non-Reactor	2,911	11,012	12,742	7,608	22,500	33,497	36,150

DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
FY 1991 CONGRESSIONAL BUDGET
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(Dollars in Thousands)

SAVANNAH RIVER OPERATIONS OFFICE SAVANNAH RIVER OPERATIONS OFFICE	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
3. Non-Nuclear	390	5,515	36,509	37,943	52,865	67,773	66,531
Subtotal Compliance Activities	56,179	83,811	213,070	251,174	246,059	192,653	176,222
(Operating Expense)	(18,079)	(11,091)	(9,500)	(7,589)	(6,309)	(6,503)	(2,822)
(Capital Equipment)	(9,700)	(16,120)	(12,500)	(5,435)	(4,800)	(8,750)	(3,300)
(General Plant Projects)	(1,000)	(900)	(5,420)	(900)	(600)	(0)	(0)
(Construction)	(27,400)	(55,700)	(185,650)	(237,250)	(234,350)	(177,400)	(170,100)
(Total Non-Add)	(56,179)	(83,811)	(213,070)	(251,174)	(246,059)	(192,653)	(176,222)
Total Safety and Health	310,780	337,752	467,624	517,716	521,475	474,822	469,191
(Operating Expense)	(272,680)	(265,032)	(264,054)	(274,131)	(281,725)	(288,672)	(295,791)
(Capital Equipment)	(9,700)	(16,120)	(12,500)	(5,435)	(4,800)	(8,750)	(3,300)
(General Plant Projects)	(1,000)	(900)	(5,420)	(900)	(600)	(0)	(0)
(Construction)	(27,400)	(55,700)	(185,650)	(237,250)	(234,350)	(177,400)	(170,100)
(Total Non-Add)	(310,780)	(337,752)	(467,624)	(517,716)	(521,475)	(474,822)	(469,191)
Total Materials Production	382,022	418,700	566,573	598,483	617,861	570,505	588,338
(Operating Expense)	(343,922)	(345,980)	(363,003)	(354,898)	(378,111)	(384,355)	(414,938)
(Capital Equipment)	(9,700)	(16,120)	(12,500)	(5,435)	(4,800)	(8,750)	(3,300)
(General Plant Projects)	(1,000)	(900)	(5,420)	(900)	(600)	(0)	(0)
(Construction)	(27,400)	(55,700)	(185,650)	(237,250)	(234,350)	(177,400)	(170,100)
(Total Non-Add)	(382,022)	(418,700)	(566,573)	(598,483)	(617,861)	(570,505)	(588,338)
New Production Reactors							
I. Environment							
A. Base Activity (OE)							
1. Base Activity	2,500	2,700	1,300	0	0	0	0
TOTAL ATOMIC ENERGY DEFENSE ACTIVITIES	389,967	426,491	572,930	603,654	623,316	576,163	594,193
(Operating Expense)	(351,867)	(353,566)	(369,360)	(360,069)	(383,566)	(390,013)	(420,793)
(Capital Equipment)	(9,700)	(16,325)	(12,500)	(5,435)	(4,800)	(8,750)	(3,300)
(General Plant Projects)	(1,000)	(900)	(5,420)	(900)	(600)	(0)	(0)
(Construction)	(27,400)	(55,700)	(185,650)	(237,250)	(234,350)	(177,400)	(170,100)
(Total Non-Add)	(389,967)	(426,491)	(572,930)	(603,654)	(623,316)	(576,163)	(594,193)
TOTAL SAVANNAH RIVER OPERATIONS OFFICE	389,967	426,491	572,930	603,654	623,316	576,163	594,193
(Operating Expense)	(351,867)	(353,566)	(369,360)	(360,069)	(383,566)	(390,013)	(420,793)
(Capital Equipment)	(9,700)	(16,325)	(12,500)	(5,435)	(4,800)	(8,750)	(3,300)
(General Plant Projects)	(1,000)	(900)	(5,420)	(900)	(600)	(0)	(0)
(Construction)	(27,400)	(55,700)	(185,650)	(237,250)	(234,350)	(177,400)	(170,100)
(Total Non-Add)	(389,967)	(426,491)	(572,930)	(603,654)	(623,316)	(576,163)	(594,193)

DEPARTMENT OF ENERGY
Environment Safety & Health Reporting System
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SAVANNAH RIVER OPERATIONS OFFICE
SAVANNAH RIVER OPERATIONS OFFICE

	FY 1989 OBS	FY 1990 OBS	FY 1991 B/A	FY 1992 B/A	FY 1993 B/A	FY 1994 B/A	FY 1995 B/A
TOTAL SAVANNAH RIVER OPERATIONS OFFICE	389,967	426,491	572,930	603,654	623,316	576,163	594,193
(Operating Expense)	(351,867)	(353,566)	(369,360)	(360,069)	(383,566)	(390,013)	(420,793)
(Capital Equipment)	(9,700)	(16,325)	(12,500)	(5,435)	(4,800)	(8,750)	(3,300)
(General Plant Projects)	(1,000)	(900)	(5,420)	(900)	(600)	(0)	(0)
(Construction)	(27,400)	(55,700)	(185,650)	(237,250)	(234,350)	(177,400)	(170,100)
(Total Non-Add)	(389,967)	(426,491)	(572,930)	(603,654)	(623,316)	(576,163)	(594,193)
Total Department of Energy	755,583	847,067	1,013,735	1,075,774	1,074,562	1,015,596	1,001,333
(Operating Expense)	(672,290)	(718,584)	(751,065)	(724,797)	(730,854)	(732,434)	(773,709)
(Capital Equipment)	(15,370)	(26,156)	(37,291)	(23,474)	(6,081)	(9,588)	(4,442)
(General Plant Projects)	(7,257)	(14,382)	(12,239)	(7,803)	(5,640)	(5,669)	(1,933)
(Construction)	(60,667)	(87,945)	(213,140)	(319,700)	(331,987)	(267,905)	(221,249)
(Total Non-Add)	(755,584)	(847,067)	(1,013,735)	(1,075,774)	(1,074,562)	(1,015,596)	(1,001,333)

General Defense Activities

Mr. Bevill. Please provide tables showing GSO and inventory balances for this appropriation by activity and location for FY 1989, FY 1990, and FY 1991.

Mr. Tuck. I will provide tables for the record showing these balances.

(The information follows:)

ATOMIC ENERGY DEFENSE ACTIVITIES
GOODS AND SERVICES ON ORDER
(IN THOUSANDS OF DOLLARS)

	FY 1989	FY 1990	FY 1991
Weapons Activities	$638,940	$606,665	$614,758
Nuclear Materials Production	146,449	148,150	148,150
Waste Transportation & Site Management	4,092	6,223	6,223
Verification & Control Technology	26,253	14,404	14,125
Nuclear Safeguards & Security	15,879	15,879	15,879
Security Investigations	5,104	5,104	5,104
New Production Reactor	9,919	6,945	7,937
Naval Reactors Development	139,075	127,045	121,245
Total, Atomic Energy Defense Activities	$985,711	$930,415	$933,421

ATOMIC ENERGY DEFENSE ACTIVITIES
INVENTORY BALANCES BY ACTIVITY AND LOCATION
(IN THOUSANDS OF DOLLARS)

WEAPONS ACTIVITIES	FY 1989	FY 1990	FY 1991
Special Reactor Materials			
Albuquerque Operation Office	$ 41,010	$ 41,700	$ 43,884
Chicago Operations Office	36	36	36
San Francisco Operations Office	125	135	135
Schenectady Naval Reactors Office	4	0	0
Oak Ridge Operations Office	0	0	0
Total, Special Reactor Materials	$ 41,175	$ 41,871	$ 44,055
Other Special Materials			
Albuquerque Operations Office	$ 15,212	$ 15,731	$ 16,023
Nevada Operations Office	81	80	80
San Francisco Operations Office	1,798	1,865	1,865
Oak Ridge Operations Office	599	539	539
Total, Special Materials	$ 17,690	$ 18,215	$ 18,507
Special Process Spares			
Albuquerque Operations Office	$ 14,284	$ 15,775	$ 16,775
Total, Other Special Materials	$ 14,284	$ 15,775	$ 16,775
Common Use Stores			
Albuquerque Operations Office	$ 49,311	$ 51,096	$ 52,117
Nevada Operations Office	25,061	24,561	25,061
San Francisco Operations Office	9,697	9,500	9,500
Oak Ridge Operations Office	27,214	26,716	26,146
Total, Common Use Stores	$ 111,283	$ 111,873	$ 112,824
TOTAL, WEAPONS ACTIVITIES	$ 184,432	$ 187,734	$ 192,161

	FY 1989	FY 1990	FY 1991
NUCLEAR WEAPONS PRODUCTION			
Special Reactor Materials			
Albuquerque Operation Office	$ 0	$ 0	$ 0
Chicago Operations Office	785	785	785
Idaho Operations Office	45	0	0
Oak Ridge Operations Office	0	0	0
Richland Operations Office	14,550	14,550	14,550
San Francisco Operations Office	88	65	65
Savannah River Operations Office	111,257	94,414	92,189
Total, Special Reactor Materials	$ 126,725	$ 109,814	$ 107,589
Other Special Materials			
Idaho Operations Office	18	0	0
Oak Ridge Operations Office	7,122	1,996	2,196
Richland Operations Office	11	11	11
Savannah River Operations Office	1,547	1,506	1,506
Total, Special Materials	8,698	3,513	3,713
Special Process Spares			
Idaho Operations Office	4,821	5,242	6,062
Oak Ridge Operations Office	101	140	146
Richland Operations Office	10,495	10,715	11,343
Savannah River Operations Office	39,060	41,613	46,852
Total, Other Special Materials	54,477	57,710	64,403
Common Use Stores			
Idaho Operations Office	227	0	0
Oak Ridge Operations Office	8,469	8,071	8,171
Richland Operations Office	2,850	2,850	2,850
Savannah River Operations Office	39,317	33,026	34,402
Total, Common Use Stores	50,863	43,947	45,423
TOTAL, NUCLEAR MATERIALS PRODUCTION	$ 240,763	$ 214,984	$ 221,128

	FY 1989	FY 1990	FY 1991
DEFENSE WASTE & ENVIRONMENTAL RESTORATION			
Other Special Materials			
Idaho Operations Office	$ 137	$ 139	$ 150
Richland Operations Office	125	4,743	4,783
Total, Other Special Materials	262	4,882	4,933
Special Process Spares			
Idaho Operations Office	1,694	2,100	2,200
Richland Operations Office	5,866	6,886	7,236
Total, Special Process Spares	7,560	8,986	9,436
Common Use Stores			
Idaho Operations Office	3,506	3,871	4,021
Richland Operations Office	8,103	4,211	4,331
Total, Common Use Stores	11,609	8,082	8,352
TOTAL, DEFENSE WASTE & ENVIRONMENTAL RESTORATION	$19,431	$21,950	$22,721

	FY 1989	FY 1990	FY 1991
NAVAL REACTOR DEVELOPMENT			
Special Reactor Materials			
Idaho Operations Office	$ 4,124	$ 4,124	$ 4,124
Pittsburgh Naval Reactors Office	21,518	24,600	24,700
Schenectady Naval Reactors Office	524	700	600
Total, Special Reactor Materials	26,166	29,424	29,424
Other Special Materials			
Pittsburgh Naval Reactors Office	72	100	100
Schenectady Naval Reactors Office	82	100	100
Total, Other Special Materials	154	200	200
Fuel Fabrication			
Idaho Operations Office	15,059	14,950	15,200
Total, Fuel Fabrication	15,059	14,950	15,200
Special Process Spares			
Idaho Operations Office	5,430	5,568	6,248
Pittsburgh Naval Reactors Office	14,654	17,300	22,200
Schenectady Naval Reactors Office	27,841	28,700	29,600
Total, Special Process Spares	47,925	51,568	58,048
Common Use Stores			
Pittsburgh Naval Reactors Office	3,847	2,000	2,000
Schenectady Naval Reactors Office	2,040	1,300	1,300
Total, Common Use Stores	5,887	3,300	3,300
TOTAL, NAVAL REACTORS DEVELOPMENT	95,191	99,442	106,172
TOTAL, ATOMIC ENERGY DEFENSE ACTIVITIES	$539,817	$524,110	$542,182

The FY 1989 column contains actual data extracted from the Department's Financial Information System. The estimates for FY 1990 and 1991 are based on the FY 1989 budget structure; therefore, they do not reflect funds transferred to the Environmental Management organization.

Mr. Bevill. Please provide a table showing indirect expenses for this appropriation by activity and location for FY 1989, FY 1990, and FY 1991. Please show the components that make up the indirect expenses accounts.

Mr. Tuck. I will provide a table for the record showing indirect expenses by location and by category. (The information follows:)

SUMMARY OF INDIRECT EXPENSES BY CATEGORY
WEAPONS RESEARCH, DEVELOPMENT AND TESTING
(IN THOUSANDS OF DOLLARS)

	Mgmt. & Admin. Services	Plant Maint. & Utilities	Protect. Services	Mfg. & Product Support	All Other	Total Indirect Expenses
FY 1989						
LANL	$ 42,540	$ 15,999	$ 6,620	$ 0	$ 0	$ 65,159
LLNL	36,065	57,086	8,155	0	0	101,306
SNL	56,115	33,716	13,793	0	14,264	117,888
NV	15,718	2,895	3,214	0	2,483	24,310
Total	$150,438	$109,696	$ 31,782	$ 0	$ 16,747	$308,663
FY 1990						
LANL	$ 45,251	$ 17,018	$ 7,042	$ 0	$ 0	$ 69,311
LLNL	38,210	63,050	9,940	0	0	111,200
SNL	55,679	33,117	18,802	0	13,708	121,306
NV	16,190	2,982	3,310	0	2,557	25,039
Total	$155,330	$116,167	$ 39,094	$ 0	$ 16,265	$326,856
FY 1991						
LANL	$ 47,740	$ 17,955	$ 7,429	$ 0	$ 0	$ 73,124
LLNL	39,360	64,940	10,240	0	0	114,540
SNL	60,434	35,705	14,888	0	15,140	126,167
NV	16,675	3,071	3,410	0	2,634	25,790
Total	$164,209	$121,671	$ 35,967	$ 0	$ 17,774	$339,621

SUMMARY OF INDIRECT EXPENSES BY CATEGORY
WEAPONS PRODUCTION AND SURVEILLANCE
(IN THOUSANDS OF DOLLARS)

	Mgmt. & Admin. Services	Plant Maint. & Utilities	Protect. Services	Mfg. & Product Support	All Other	Total
FY 1989						
Albuquerque	$ 196,267	$ 142,170	$ 99,982	$ 232,352	$ 0	$ 670,771
Oak Ridge	59,165	78,975	61,605	71,645	0	271,390
Savannah River	7.357	8,265	4,588	0	0	20,210
Total	$ 262,789	$ 229,410	$ 166,175	$ 303,997	$ 0	$ 962,371
FY 1990						
Albuquerque	$ 219,954	$ 156,778	$ 100,540	$ 238,477	$ 0	$ 715,749
Oak Ridge	66,230	89,421	92,725	82,790	0	331,166
Savannah River	8,120	7,905	5,340	0	0	21,365
Total	$ 294,304	$ 254,104	$ 198,605	$ 321,267	$ 0	$1,068,280
FY 1991						
Albuquerque	$ 271,174	$ 201,605	$ 130,423	$ 261,988	$ 0	$ 865,190
Oak Ridge	74,930	112,400	108,060	98,990	0	394,380
Savannah River	10,020	8,020	7,010	0	0	25,050
Total	$ 356,124	$ 322,025	$ 245,493	$ 360,978	$ 0	$1,284,620

SUMMARY OF INDIRECT EXPENSES BY CATEGORY
NUCLEAR MATERIALS PRODUCTION
(IN THOUSANDS OF DOLLARS)

	Mgmt. & Admin. Services	Plant Maint. & Utilities	Protect. Services	Mfg. & Product Support	All Other	Total Indirect Expenses
FY 1989						
Albuquerque	$ 3,229	$ 1,936	$ 782	$ 0	$ 1,796	$ 7,743
Idaho	21,490	6,775	7,565	4,866	1,607	42,303
Oak Ridge	20,982	10,647	6,412	2,602	19,526	60,169
Richland	83,400	16,400	13,200	0	0	113,000
San Francisco	8,900	3,800	1,400	0	0	14,100
Savannah River	100,209	32,742	9,080	0	0	142,031
Total	$ 238,210	$ 72,300	$ 38,439	$ 7,468	$ 22,929	$ 379,346
FY 1990						
Albuquerque	$ 2,367	$ 1,419	$ 573	$ 0	$ 1,318	$ 5,677
Idaho	23,165	7,355	9,000	5,290	1,190	46,000
Oak Ridge	15,754	7,545	3,586	2,430	11,177	40,492
Richland	70,000	15,600	11,400	0	0	97,000
San Francisco	11,100	4,800	1,700	0	0	17,600
Savannah River	108,700	18,900	11,000	0	0	138,600
Total	$ 231,086	$ 55,619	$ 37,259	$ 7,720	$ 13,685	$ 345,369
FY 1991						
Albuquerque	$ 2,304	$ 1,382	$ 558	$ 0	$ 1,282	$ 5,526
Idaho	24,875	7,725	10,350	5,595	1,020	49,565
Oak Ridge	15,071	7,933	3,750	2,479	10,768	40,001
Richland	61,900	8,100	4,000	0	0	74,000
San Francisco	11,200	4,800	1,700	0	0	17,700
Savannah River	120,700	19,700	11,500	0	0	151,900
Total	$ 236,050	$ 49,640	$ 31,858	$ 8,074	$ 13,070	$ 338,692

GENERAL DEFENSE ACTIVITIES

Mr. Bevill. What rate of inflation was assumed for this appropriation in FY 1989, FY 1990, and FY 1991. Please provide the details that form the composite.

Mr. Tuck. There was no one specific rate of inflation assumed for the Atomic Energy Defense Activities Appropriation. The budget was developed in accordance with inflation rates for activities carried out in different regions of the country. Typically, the rates ranged from 4 percent to 5.5 percent.

Mr. Bevill. Please provide a table showing the amounts for restoration, revitalization, and prevention of plant deterioration for FY 1989, FY 1990, and FY 1991. In the later category, include GPP, capital equipment, and operating expenses. Please provide this information by activity and location.

Mr. Tuck. I will insert this information for the record. (The information follows:)

WEAPONS ACTIVITIES
PLANT MAINTENANCE
(Dollars in Millions)

	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991
Restoration													
Albuquerque Operations Office	$ 0	$ 15.4	$ 13.7	$ 65.5	$ 53.7	$ 47.5	$ 55.1	$ 24.0	$ 3.3	$ 4.6	$ 0	$ 0	$ 0
Lawrence Livermore National Lab.	0	3.4	6.3	7.0	8.0	15.6	16.5	17.5	8.2	9.1	0	0	0
Los Alamos National Laboratory	0	3.9	6.5	7.0	8.5	15.1	16.6	17.4	9.6	13.1	0	0	0
Nevada Operations Office	0	6.3	7.7	11.0	14.5	19.4	19.2	14.3	6.5	0	0	0	0
Oak Ridge Operations Office	2.2	22.3	13.3	42.9	57.1	68.5	37.8	61.3	64.6	41.5	0	0	0
Sandia National Laboratories	0	4.4	6.5	7.2	9.0	15.6	16.7	17.8	8.2	8.6	0	0	0
Savannah River Operations Office	0	4.4	6.5	7.2	9.0	15.6	16.7	17.8	8.2	8.6	0	0	0
Total Restoration	$ 2.2	$ 60.1	$ 60.5	$ 147.8	$ 159.8	$ 197.3	$ 178.7	$ 170.1	$ 108.6	$ 85.5	$ 0	$ 0	$ 0
Revitalization													
Albuquerque Operations Office	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Lawrence Livermore National Lab.	0	0	0	0	0	7.8	12.9	11.8	18.2	17.2	18.8	35.5	32.4
Los Alamos National Laboratory	0	0	0	0	0	3.8	10.9	5.2	1.1	3.5	11.7	20.7	21.8
Nevada Operations Office	0	0	0	0	0	17.5	26.6	17.7	18.5	24.9	15.6	4.8	9.8
Oak Ridge Operations Office	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandia National Laboratories	0	0	0	0	0	0	6.9	13.2	13.7	15.3	33.1	33.0	33.1
Savannah River Operations Office	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Revitalization	$ 0	$ 0	$ 0	$ 0	$ 0	$ 29.1	$ 57.3	$ 47.9	$ 51.5	$ 60.9	$ 79.2	$ 94.0	$ 97.1
Prevention of Plant Deterioration													
Albuquerque Operations Office	$ 23.6	$ 30.5	$ 41.6	$ 119.1	$ 152.1	$ 172.1	$ 192.6	$ 233.5	$ 224.1	$ 225.3	$ 215.0	$ 221.6	$ 256.6
Lawrence Livermore National Lab.	15.0	17.3	16.6	40.7	42.7	67.7	82.4	45.6	94.5	92.7	53.2	59.9	58.6
Los Alamos National Laboratory	12.2	15.1	14.1	46.9	49.5	78.4	88.8	88.3	83.4	91.5	65.3	74.1	72.8
Nevada Operations Office	15.8	20.5	29.1	39.6	43.8	67.2	68.8	93.0	101.4	79.4	83.0	85.8	79.6
Oak Ridge Operations Office	5.0	5.6	10.1	41.1	49.0	96.6	105.2	93.1	113.9	125.0	111.9	135.4	146.7
Sandia National Laboratories	27.4	18.1	19.3	62.5	66.1	80.2	86.4	95.4	104.8	109.4	125.8	137.8	139.8
Savannah River Operations Office	1.1	1.0	2.2	6.0	7.5	163.0	170.5	180.2	8.0	11.4	18.2	16.6	15.9
Total Prevention of Plant Deterioration	$ 100.1	$ 108.1	$ 133.0	$ 355.9	$ 410.7	$ 725.2	$ 794.7	$ 829.1	$ 730.1	$ 734.7	$ 672.4	$ 731.2	$ 770.0

WEAPONS ACTIVITIES
PLANT MAINTENANCE
(Dollars in Millions)

	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991
Facilities Capability Assurance Program													
Albuquerque Operations Office	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 12.7	$ 57.2	$ 52.3	$ 87.2
Oak Ridge Operations Office	0	0	0	0	0	0	0	0	0	2.7	22.1	29.6	44.7
Savannah River Operations Office	0	0	0	0	0	0	0	0	0	0	0	0	0
Total, Facilities Capability Assurance Program	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 15.4	$ 79.3	$ 81.9	$ 131.9

NUCLEAR MATERIALS PRODUCTION
PLANT MAINTENANCE
(Dollars in Millions)

	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991
Restoration							
Idaho	$ 14.6	$ 18.6	$ 41.5	$ 39.6	$ 63.0	$ 71.6	$ 100.4
Oak Ridge	5.7	0	0	2.0	45.1	34.7	36.3
Richland	10.4	2.2	0	0	0	0	0
Savannah River	66.8	40.2	7.8	13.2	5.9	0	0
Total, Restoration	$ 97.5	$ 61.0	$ 49.3	$ 54.8	$ 114.0	$ 106.3	$ 136.7
Revitalization							
Idaho	$ 0	$ 0	$ 0	$ 0	$ 16.8	$ 14.5	$ 18.8
Oak Ridge	0	6.6	36.8	22.5	22.2	32.9	13.1
Richland	0	3.1	17.6	17.3	3.4	3.3	4.7
Savannah River	0	9.9	21.8	34.0	0	0	0
Total, Revitalization	$ 0	$ 19.6	$ 76.2	$ 73.8	$ 42.4	$ 50.7	$ 36.6
Prevention of Plant Deterioration							
Albuquerque	$ 5.5	$ 6.5	$ 3.9	$ 3.1	$ 0.9	$ 1.0	$ 1.0
Idaho	22.4	18.7	22.5	12.3	9.5	13.0	7.3
Oak Ridge	20.5	44.2	63.6	19.0	11.4	12.1	9.7
Richland	86.5	84.5	98.1	79.6	84.6	85.1	85.5
San Francisco	0.8	0.9	1.0	1.0	1.0	1.0	1.0
Savannah River	173.1	187.2	182.0	185.3	273.2	301.3	394.1
Total, Prevention of Deterioration .	$ 308.8	$ 342.0	$ 371.1	$ 300.3	$ 380.6	$ 413.5	$ 498.6

SAFEGUARDS AND SECURITY

Mr. Bevill. What role is the Defense Nuclear Facilities Safety Board playing in current Defense Programs' operations?

Mr. Tuck. The National Defense Authorization Act of 1989 established a Defense Nuclear Facilities Safety Board, DNFSB, to provide an independent, high level safety oversight of certain DOE facilities. Its purposes are to review and evaluate the content and implementation of the standards relating to the design, construction, operation, and decommissioning of defense nuclear facilities of the Department of Energy, to conduct investigations, to conduct analysis of design and operational data, and to make recommendations to the Secretary of Energy defense nuclear facilities.

The Defense Board is providing independent external oversight in the restart plans for the Department's Rocky Flats facility and the Savannah River reactors.

Mr. Bevill. Please describe the current DOE threat statement. When was it developed and how does it differ from the previous one? To what extent is your assumed threat coordinated with other Federal agencies?

Mr. Tuck. The Department's current Threat Policy Statement was issued in January 1983. The statement identifies and characterizes a range of generic adversaries which, if unchecked, could imperil national security and public health and safety. Previous threat policies were not as specific as the 1983 Threat Policy Statement. The current guidance was designed to improve the Department of Energy's capabilities to detect, identify, and inhibit unauthorized access to nuclear weapons, test devices, special nuclear materials, and other strategic materials and associated facilities.

Specifically, for acts of theft or diversion of nuclear weapons or test devices, protection strategies are to be designed to preclude unauthorized access or use. With respect to significant quantities of special nuclear materials, protection must be designed to preclude acts of sabotage that could endanger national security and/or public health and safety. Lastly, increased emphasis was placed on the knowledgeable insider or insiders working alone or in collusion.

Utilizing the 1983 Threat Policy Statement as a baseline, a complete reassessment of our protection capabilities at each site was conducted by the Office of Safeguards and Security. Major deficiencies were identified throughout the DOE complex. The majority of deficiencies associated with the potential outsider threat have been mitigated. Emphasis is now being placed on reaching the same level of confidence with regard to the potential insider threats. This focus is reflected in our FY 1991 and outyear budget requests.

In developing the 1983 Threat Policy Statement, DOE thoroughly coordinated its efforts with technical experts of the Nuclear Regulatory Commission, the Federal Bureau of Investigation, and the Central Intelligence Agency. The view of the Department of Defense was also sought during the development of the Threat Policy Statement. In addition to utilizing in-house and other government experts, the expertise of consultant firms, such as Rand Corporation, was also employed.

The threat policy guidance is dynamic in nature and, as such, influenced by daily events occurring throughout the world. Recognizing this, there is continual interface between the Departments of Energy and Defense, the Nuclear Regulatory Commission, the Federal Bureau of Investigation, and other member organizations of the intelligence community for purposes of information exchange and the cross-fertilization of ideas and concepts on areas impacting the perceived threat to the operations and facilities of each entity.

Within DOE, we established an Office of Threat Assessment to act as an infrastructure to collect, assess, and disseminate threat information. This serves as a center to acquire, evaluate, process, analyze, and disseminate strategic, tactical, and other forms of information necessary in characterizing malevolent acts and adversaries posing potential threats to DOE. In doing so, the Office of Threat Assessment maintains continuous contact with the intelligence community and other Federal agencies.

Additionally, however, we initiated a new threat policy review effort to ensure that the policy is current and accurate. This effort is expected to be completed by July 1990.

It is our belief that these two offices, the Office of Safeguards and Security and the Office of Threat Assessment, have significantly enhanced and will continue to enhance the Department's focus on potential threats to its facilities and thereby improve our capabilities to mitigate effectively potential adversarial acts in a more timely and effective manner.

SAFEGUARDS AND SECURITY

Mr. Bevill. What is the status of the effort to significantly increase the security of the weapons complex?

Mr. Tuck. Before I discuss the details of our effort to significantly increase the security of the weapons complex, I would like to provide you with the status of the Secretary's review of the DOE facilities. As part of this overall review, Secretary Watkins has asked me to conduct a comprehensive review of those facilities. I have outlined a four step plan and formed a task force of uniquely qualified individuals to accomplish the review. The task force has provided an interim status report which highlights several items requiring attention by all Departmental elements, as well as several safeguards and security activities that deserve special recognition for a job well done. Areas of concern to date include: classified document control, nuclear material control and accountability, clearance process, control of foreign visits, and protective force qualifications and training. The task force is continuing this review and is to present a final report in the near future.

As has been reported to the President in the Annual Report on Domestic Safeguards and Security, the Department of Energy's ability to mitigate the potential outsider threat has greatly improved. This accomplishment has been due in part to sustained high management attention to safeguards and security upgrade initiatives and the strengthening of DOE's protective forces. The protective forces are better trained and better equipped than ever before and are now a paramilitary, proactive force capable of protecting our national security interests. The Department is using helicopters at its four largest sites for enhanced surveillance and response during security emergencies. High-tech perimeter intrusion detection systems have been installed at almost all our facilities. Lastly, our fabric of deterrence, in terms of access controls, barriers, guard towers, hardened sites, and security response team capabilities is as good as any security system in the United States.

With our improved ability to mitigate the outsider threat, we have shifted the emphasis of our safeguards and security program to the development of protective systems and strategies to mitigate the potential insider threat. Much work remains to be done, but improvement continues to be made as a result of administering fundamental programs at our critical facilities designed at deterring and reducing the probability of the potential insider threat, detecting such a threat, and mitigating the consequences of such an act should one be attempted. Examples of such programs include: material control and accountability, personnel clearance, human reliability programs, compartmentalization, inventory reduction and consolidation, and effective access controls. Finally, our research and development program continues to product advances such as better measurement equipment and systems designed to increase the assurance that nuclear material loss is not masked by measurement uncertainties or data falsification, which are designed to provide a defense-in-depth approach in addressing the potential insider threat.

The Department will also continue to focus attention toward maintaining a high level of protection for its classified matter. Enhanced programs and procedures are under development to assure that the Department's classified documents, parts, and classified information on computers are adequately protected.

In summary, the Department remains fully committed to assuring that effective protection systems are in place to prevent acts of theft, espionage, or sabotage that could disrupt or endanger the nation's nuclear weapons stockpile or other national security interests or threaten public health and safety.

Mr. Bevill. Have any DOE facilities experienced any threat in the past five years that approached the threat guidance now in effect?

Mr. Tuck. The Department of Energy facilities have not experienced any threat in the past five years that approached the threat guidance now in effect.

Mr. Bevill. What security measures have been implemented to protect computer data and systems within the DOE weapons complex?

Mr. Tuck. Classified computer data and systems within the Department of Energy weapons complex are protected against unauthorized access by insiders as well as by outsiders. Physical security mechanisms, access controls to resources, internal procedures, and procedures for handling output are used to protect systems and data from outsiders. In addition, access controls to resources, data labeling, internal system controls on data access, and output and media handling procedures are used to protect against unauthorized insiders. These measures and procedures, and others, are described in DOE Order 5637.1A., Classified Computer Security Program.

SAFEGUARDS AND SECURITY

Mr. Bevill. Describe what is meant by the term "insider threat."

Mr. Tuck. An insider is a knowledgeable and trusted individual who has been granted access to classified information or sensitive facilities. The Department continues to develop and implement protection measures for deterring and reducing the probability of an insider threat, detecting such a threat, and mitigating the consequences of such an act should one be attempted.

Mr. Bevill. Provide a crosscut by location of all Safeguards and Security funding throughout the Department for FY 1989, FY 1990, and FY 1991.

Mr. Tuck. I will provide the information for the record. (The information follows:)

SAFEGUARDS AND SECURITY
FY 1989 - FY 1991 CROSSCUT BY FACILITY
(IN THOUSANDS OF DOLLARS)

ORGANIZATION/FACILITY	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
ALBUQUERQUE OPERATIONS OFFICE			
Albuquerque Direct	$ 83,636	$ 88,083	$ 99,535
Kansas City Plant	7,367	9,296	8,225
Los Alamos National Laboratory	62,777	55,458	11,513
Mound Plant	9,990	10,282	57,954
Pantex Plant	29,726	28,448	41,892
Pinellas Plant	6,107	6,218	6,795
Rocky Flats Plant	31,072	32,940	35,480
Sandia National Laboratory	47,788	45,610	49,427
Total Albuquerque	$278,463	$276,335	$310,821
CHICAGO OPERATIONS OFFICE			
Chicago Direct	$ 2,332	$ 2,453	$ 3,741
Ames National Laboratory	695	719	712
Argonne National Laboratory	6,847	6,633	7,281
Brookhaven National Laboratory	7,223	8,009	8,138
New Brunswick Laboratory	4,097	4,370	4,276
Solar Energy Research Institute	365	378	431
Total Chicago	$ 21,559	$ 22,562	$ 24,579
IDAHO OPERATIONS OFFICE	$ 27,454	$ 27,296	$ 31,457
NAVAL PETROLEUM	$ 1,110	$ 1,182	$ 1,185
NEVADA OPERATIONS OFFICE	$ 63,215	$ 61,941	$ 69,906
OAK RIDGE OPERATIONS OFFICE			
Oak Ridge National Laboratory	$ 5,218	$ 5,263	$ 5,682
Oak Ridge Direct	121,845	118,853	130,307
Total Oak Ridge	$127,063	$124,116	$135,989
OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION	$ 660	$ 330	$ 250
PITTSBURGH NAVAL REACTORS	$ 12,125	$ 12,553	$ 14,308
RICHLAND OPERATIONS OFFICE	$ 54,326	$ 55,352	$ 59,512

SAFEGUARDS AND SECURITY CROSSCUT BY FACILITY (CONTINUED)
(IN THOUSANDS OF DOLLARS)

ORGANIZATION/FACILITY	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
SAN FRANCISCO OPERATIONS OFFICE			
San Francisco Direct	$ 1,334	$ 1,484	$ 1,521
Lawrence Livermore National Lab	39,478	39,717	35,036
Total San Francisco	$ 40,812	$ 41,201	$ 36,557
SAVANNAH RIVER OPERS OFFICE	$133,079	$127,412	$134,549
SCHENECTADY NAVAL REACTORS	$ 18,139	$ 16,190	$ 17,182
STRATEGIC PETRO RESERVE OFFICE	$ 20,242	$ 24,826	$ 20,145
HEADQUARTERS	$ 79,334	$ 74,234	$ 99,557
TOTAL	$877,581	$865,530	$955,997

Mr. Bevill. Please provide a table showing the size of guard forces and expenditures for guard forces by location for FY 1989, FY 1990, and FY 1991.

Mr. Tuck. I will provide the information for the record. (The information follows:)

PROTECTIVE FORCE SIZE AND EXPENDITURES
(THOUSANDS OF DOLLARS)

	FY 1989 Size	FY 1989 Expenditures	FY 1990 Size	FY 1990 Expenditures	FY 1991 Size	FY 1991 Expenditures
Albuquerque Operations						
Pantex Plant		$ 15,489		$ 16,248		$ 16,129
Los Alamos National Lab.		17,225		18,103		19,240
Mound Laboratory		3,216		3,238		3,464
Rocky Flats Plant		13,700		14,323		14,963
Sandia National Lab.*		11,351		11,484		11,800
Kansas City	Deleted	3,356	Deleted	3,518	Deleted	3,774
Pinellas		2,988		3,052		3,239
WIPP		880		927		1,135
AL (Feds)		273		407		416
TOTAL, Albuquerque		$ 68,478		$ 71,300		$ 74,160

* Includes Facilities at Albuquerque, Livermore, and Tonopah

	FY 1989 Size	FY 1989 Expenditures	FY 1990 Size	FY 1990 Expenditures	FY 1991 Size	FY 1991 Expenditures
Chicago Operations						
Argonne National Lab-East		$ 2,438		$ 2,616		$ 2,747
Argonne National Lab-West		2,117		2,345		2,485
Brookhaven National Lab.	Deleted	4,800	Deleted	4,494	Deleted	4,752
TOTAL, Chicago		$ 9,355		$ 9,455		$ 9,984
Idaho Operations						
Idaho National Eng. Lab.		$ 16,478		$ 17,944		$ 20,275
Nevada Operations	Deleted		Deleted		Deleted	
Nevada Test Site and Las Vegas Sites		$ 24,345		$ 26,802		$ 27,768

PROTECTIVE FORCE SIZE AND EXPENDITURES
(THOUSANDS OF DOLLARS)
(continued)

	FY 1989 Size/Expenditures	FY 1990 Size/Expenditures	FY 1991 Size/Expenditures
Oak Ridge Operations			
Portsmouth Gaseous Diffusion Plant	$ 9,700	$ 10,350	$ 11,400
Oak Ridge Gaseous Diffusion Plant	6,014	6,684	7,138
Oak Ridge National Lab.	3,373	3,524	3,683
Paducah Gaseous Diffusion Plant	2,409	2,792	3,019
Y-12	20,200	22,105	23,010
S&C (OR Fed Building)	1,800	1,550	1,600
Westinghouse (National Lead)	1,707	1,731	1,770
	Deleted	Deleted	Deleted
Strategic Petroleum Reserve	10,799	11,837	12,397
TOTAL, Oak Ridge	$ 56,002	$ 60,573	$ 64,017
Pittsburgh Naval Reactor			
Naval Reactors Facility at Idaho	$ 2,468	$ 2,233	$ 2,259
Westinghouse-Bettis Atomic Power Lab.	2,062	2,150	2,209
	Deleted	Deleted	Deleted
TOTAL, Pittsburgh	$ 4,530	$ 4,383	$ 4,468
Richland Operations	$ 29,659	$ 28,500	$ 28,500
San Francisco Operations			
Lawrence Livermore National Lab.	$ 11,078	$ 11,731	$ 13,002
ESG (Energy Systems Group)	1,950	2,535	2,624
	Deleted	Deleted	Deleted
TOTAL, San Francisco	$ 13,028	$ 14,266	$ 15,626
Savannah River Operations	$ 29,411	$ 30,923	$ 33,688

PROTECTIVE FORCE SIZE AND EXPENDITURES
(THOUSANDS OF DOLLARS)
(continued)

	FY 1989		FY 1990		FY 1991	
	Size/Expenditures		Size/Expenditures		Size/Expenditures	
Schenectady Naval Reactors						
Knolls Atomic Power Lab.		$ 5,900		$ 6,000		$ 6,200
Windsor Site		2,200		2,200		2,200
TOTAL, Schenectady	Deleted	$ 8,100	Deleted	$ 8,200	Deleted	$ 8,400
DOE Headquarters		$ 5,276		$ 5,470		$ 5,658
GRAND TOTAL	5826	$264,662	5891	$277,816	5918	$292,544

SAFEGUARDS AND SECURITY

Mr. Bevill. Please characterize the results of security evaluations conducted at DOE sites during the last year.

Mr. Tuck. During 1989, the Office of Security Evaluations, OSE, conducted seven inspections and one reinspection at 13 DOE facilities involving six separate operations offices. Security topics inspected included Protective Forces, Physical Security Systems, Nuclear Material Control and Accountability, Emergency Management, Computer Security, Information Security, Personnel Security, and Safeguards and Security Survey Programs.

The inspections found that the majority of these facilities provide adequate protection to DOE security interests. However, some serious systemic problems were found affecting the protection of Special Nuclear Material at three facilities. Problems in information security were found at two facilities. These deficiencies are directly attributable to inadequate Operations Office Safeguards and Security Survey Programs. In general, while these Survey Programs meet most of the written requirements of DOE policy, they are not conducted in a manner that assures the quality of security programs under their cognizance.

Corrective actions are underway at all affected facilities, and OSE reinspections have been scheduled, the first of which was completed recently. This reinspection provided positive results that effective corrective actions have been implemented and satisfactory security is now being maintained at this facility.

An encouraging trend found during OSE inspections of the past year is the overall satisfactory status of DOE Protective Forces across the country, continuing a positive trend begun several years ago. The readiness of Protective Forces at least partially compensates for many of the problems found in other areas. Additionally, several DOE facilities have instituted effective self-audit programs, and more are considering them.

SECURITY INVESTIGATIONS

Mr. Bevill. The budget request includes a large increase for security investigations. Are there constraints on this program other than funding? If so, what are they?

Mr. Tuck. Historically, there have been two constraints on the program other than funding. The first relates to the number of Federal personnel who are available in the Department of Energy to review and adjudicate the information provided in completed investigative reports. The second relates to the Office of Personnel Management's, OPM, capability to maintain adequate staffing in order to process DOE investigation requests in a timely manner. OPM processing consists of: scheduling investigations; conducting the investigation; transcribing the investigative reports; and reviewing the completed reports, to assure adequacy of scope and coverage, prior to submission back to DOE.

The DOE is addressing its human resource problem by expanding the use of contractor support services to conduct logistical and administrative functions which permits the use of Federal employees for the more important duties of evaluating report data and rendering adjudications on eligibility for access. Some DOE offices, such as Albuquerque, have locally addressed this problem by the temporary reassignment of Federal staff to assist in the review and evaluation of backlogged completed investigations. The DOE has supported, in writing, OPM's effort to maintain current and obtain additional levels of staffing assigned to the Office of Federal Investigations; however, OPM makes independent decisions concerning staffing levels based upon the constraints imposed by the Office of Management and Budget.

Mr. Bevill. What is the current backlog of reinvestigations by performing agency? Is it increasing? What efforts are being taken to reduce the backlog?

Mr. Tuck. At the end of FY 1989, we had reduced the number of overdue reinvestigations from about 132,000 in 1985 to about 54,100. Due to budget and resource constraints both at the Department of Energy Headquarters and field offices, we may experience a delay in the processing of these overdue reinvestigations. However, we have requested congressional approval of a Departmental reprogramming in FY 1990 for $22.6 million for security investigations. With these additional funds, we should be able to eliminate backlogged reinvestigations by the end of FY 1993 as originally planned.

Mr. Bevill. What agencies perform security clearance investigations and what percentage is performed by each? Is this ratio changing? Why?

Mr. Tuck. In accordance with the requirements of the Atomic Energy Act of 1954, as amended, security clearance investigations are performed for the Department of Energy by the Office of Personnel Management and the Federal Bureau of Investigation. Of the total number of investigations, which includes Special Background Investigations, Background Investigations, Limited Background Investigations, and National Agency Checks, scheduled by DOE, about 99 percent are performed by OPM and 1 percent by the FBI. This ratio is constant.

Mr. Bevill. What is the average cost and length of investigations by each performing agency?

Mr. Tuck. I will provide the information for the record. (The information follows:)

SECURITY INVESTIGATIONS

Agency/Type of Investigation	Reimbursable Cost	Approx. Completion Time
OPM Special Background	$ 2,673	258 days
OPM Background	2,430	166 days
OPM Limited Background	1,242	203 days
OPM National Agency Check	19	89 days
FBI Background	2,685	101 days

Mr. Bevill. Does DOE currently have a backlog of security investigations pending with any agency?

Mr. Tuck. The Department of Energy currently has 28,855 background investigations of all types pending with the Office of Personnel Management, which is about 75 percent of their total 38,497 pending background investigations.

Mr. Bevill. What were the number and average cost of investigations and reinvestigations by performing agency for FY 1989, FY 1990, and FY 1991? Describe the reasons for the increases or decreases.

Mr. Tuck. The demands upon the Security Investigations program have increased significantly due to increased activities at Savannah River and Rocky Flats. These increased activities at Savannah River are associated with the reactor restart and the New Production Reactor; and at Rocky Flats with operational improvements in the area of environment, safety, and health that require additional personnel, which increase the number of initial investigations. Also, since the newly created Personnel Security Assurance Program positions are highly sensitive in nature, investigations for such positions will be conducted on a more frequent basis. They will also require a more indepth reinvestigation--for example, a Special Background Investigation. This will result in an increased number of required reinvestigations. I would like to insert tables in the record which break out the number of investigations and reinvestigations and the cost.

(The information follows:)

INVESTIGATIONS AND REINVESTIGATIONS

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request
Initial Investigations	19,712	18,635	23,527
Reinvestigations	14,950	17,489	34,574

INVESTIGATION COSTS

	Reimbursable Cost		
Agency/Type of Investigation	FY 1989	FY 1990	FY 1991
OPM Special Background	$2,225	$2,475	$2,673
OPM Background	2,000	2,250	2,430
OPM Limited Background	1,000	1,150	1,242
OPM National Agency Check	15	18	19
FBI Background	2,300	2,550	2,685

SECURITY INVESTIGATIONS

Mr. Bevill. Provide an analysis of security investigation programs showing the funds for defense and other than defense programs.

Mr. Tuck. I will provide the information for the record. (The information follows:)

SECURITY INVESTIGATIONS
FY 1991

Defense Programs Activities	$ 44,903,966
Other than Defense Programs	20,096,034
TOTAL	$ 65,000,000

Mr. Bevill. Please describe the Personnel Security Assurance Program and how it has impacted the number and cost of investigations and/or reinvestigations.

Mr. Tuck. One key component to address the potential insider threat is the implementation of the Department-wide Personnel Security Assurance Program which will systematically monitor the reliability of selected Department of Energy and contractor personnel. The Personnel Security Assurance Program is a special access authorization, security clearance, program for personnel who protect, transport, or have direct access to significant quantities of special nuclear material; operate nuclear material production reactors; or could cause grave damage to nuclear weapons production with the potential for significant impact on national security. It includes a physical and alcohol dependency examination and a psychological assessment; management review, including drug testing; and security review. The DOE Personnel Security Assurance Program Order was issued; and a final rule, which has completed the public review process, is in the process of final approval for implementation within the Department. A training program, which has been field-tested, will be implemented for individuals included in the program. A total of $7 million is included in the FY 1990 omnibus reprogramming which was transmitted to Congress on February 23, 1990, and covers approximately 3,000 Special Background Investigations to get this program started. In the FY 1991 Congressional budget $8.5 million is included for this program.

VERIFICATION AND CONTROL TECHNOLOGY

Mr. Bevill. Describe the activities of DOE in arms control negotiations. Are these activities planned to increase in FY 1991?

Mr. Tuck. Historically, the Department of Energy had nuclear testing negotiations as its primary focus. In recent years, DOE's interest and involvement have expanded to the entire range of arms control negotiations. For example, DOE provides a scientific advisor for the START negotiations and is planning to do the same for the Standing Consultative Commission. DOE has provided necessary expertise for the negotiations and activities necessary to implement the INF Treaty and is routinely represented in both bilateral and multilateral negotiations on a chemical weapons ban. In addition, DOE has given considerable support to the Nuclear Testing Talks. Through the national laboratories, DOE has provided the bulk of technical expertise, in addition to secretarial and policy support. Finally, DOE, in coordination with national laboratories, continues to be a key source for research and development of arms control verification technology and equipment. With regard to a FY 1991 increase in activities, we can expect that DOE's involvement will, at the very least, keep pace with the rapidly expanding arms control agenda and activities. These activities include not only negotiations but also the complex and technically demanding implementation requirements.

Mr. Bevill. Is there an anticipated increase in activities in the outyears due to possible treaty negotiations outcomes?

Mr. Tuck. Yes. If the Peaceful Nuclear Explosions Treaty and the Threshold Test Ban Treaty are ratified, the Department of Energy will be involved in the verification of these treaties, not only within the Soviet Union but also at the Nevada Test Site. Based on historical data, this would require the resources to verify about five tests per year in the Soviet Union. This would be a major increase in verification activity for the DOE. DOE must also anticipate the verification needs of other arms control negotiations as it plans its outyear program and this will require an increase in DOE's research and development in the areas of verification technology. The DOE's laboratories will be the principal Government resource for tackling many of the future very difficult verification problems.

Mr. Bevill. Are the plans for possible verification missions in the outyears based on a broad range of treaty scenarios or is the anticipated verification mission becoming more focused?

Mr. Tuck. Verification missions for a broad range of treaty scenarios in the outyears are both focused and unfocused. The verification for treaties with negotiations nearly completed, e.g., Threshold Test Ban Treaty, are more focused as a result of the verification protocol being better defined. For treaties not in their final negotiation phase, e.g., Strategic Arms Reduction Talks, the technologies required for verification span a broad range of treaty scenarios. The Department of Energy's verification program is intrinsically flexible to accommodate this broad range of scenarios for treaties in existence, under negotiation, anticipated.

Mr. Bevill. Are arms control negotiations requirements increasing the need for new technologies? Provide examples of verification needs where the technology is not available.

Mr. Tuck. The expanded scope of bilateral and multilateral treaty negotiations has had and continues to have a major impact on the technologies needed for treaties being negotiated and/or under consideration. An example where new verification technologies are needed is in the verification of a chemical weapons ban. We also need to anticipate the verification needs of future follow-on negotiations on strategic and conventional arms control where cheating on a small scale could have a major military impact on our security.

Mr. Bevill. How is the FY 1991 budget request coordinated to ensure that budgeted activities will reflect the actual needs stemming from treaty negotiations?

Mr. Tuck. The Department of Energy has both its arms control policy activities and its verification technology development within the Office of Arms Control. This structure enables DOE to focus its technology development in a way that conforms to the state of play in negotiations. Furthermore, this structure enables DOE to assist in the development of future policy to take into account the verification potential developed in DOE's programs.

VERIFICATION CONTROL AND TECHNOLOGY

Mr. Bevill. What are the treaty verification assumptions that the budget is based on?

Mr. Tuck. The FY 1991 budget request for Detection Technology assumes the need for a vigorous research and development program and verification technology across the complete range of future verification needs. It does not include a budget for implementation of the Threshold Test Ban Treaty and Peaceful Nuclear Explosions Treaty. At the time of the budget's preparation, the prospect for completing these treaties was uncertain. Furthermore, the Administration has not determined if operational funding for verification of the TTBT and PNE treaties 3will come from the DOE budget or the On-Site Inspection Agency. The budget also assumes that the Strategic Arms Reduction Treaty will not enter into force within this budget period, and that the Chemical Warfare Convention negotiations will still be in a preliminary stage. In addition, it does not provide for robust development of verification technologies for future potential arms control provisions requiring destroying warheads or limiting special nuclear materials.

Mr. Bevill. Is there any new information about which method, CORRTEX or seismic arrays, is better for monitoring underground testing?

Mr. Tuck. Continuous Reflectometry for Radius versus Time Experiments, CORRTEX is an onsite, direct measurement of the yield of an explosion occurring at a precise location and time. The use of CORRTEX is predicated on the premise of cooperative verification. In contrast, the seismic method requires no cooperation, is offsite, operates continuously 24 hours per day, and does not provide a direct estimate of explosion yield. At this time, CORRTEX gives significantly better accuracies in measuring yields. However, the two methods are complementary in verification of nuclear testing treaties. Over a period of time of making direct, onsite measurements of yield using CORRTEX, the uncertainty of the seismic yield estimates may be reduced for a particular geographic location.

Mr. Bevill. What is the Department's position on which method should be used for treaty verification?

Mr. Tuck. The Department of Energy's position on what methods should be used for nuclear testing treaty verification is that of the U.S. Government. Traditionally, the U.S. has been compelled to rely upon teleseismic yield estimation methods, although these methods have not been capable of effective verification. The nearly completed verification protocols to the Threshold Test Ban Treaty/Peaceful Nuclear Explosives Treaty have incorporated the long-standing U.S. requirement for the right to routine use of direct, onsite hydrodynamic yield measurement techniques--CORRTEX--as the most effective means of verification. In addition, the protocols accord rights to other verification activities, namely onsite inspection, in the event hydrodynamic measurement is not used, and in-country--regional--seismic measurements.

ADDITIONAL QUESTIONS FROM CHAIRMAN BEVILL

INTELLIGENCE ACTIVITIES

Mr. Bevill. The budget request for foreign intelligence activities provides funding to assess the report *Deleted*

Could you describe why this is an appropriate use of this country's intelligence resources?

Mr. Tuck. *Deleted*

Deleted

Mr. Bevill. How much funding is included in FY 1989, FY 1990 and FY 1991 for the activities identified in the previous question?

Mr. Tuck. I will provide that data for the record. (The information follows:)

(Dollars in Thousands)

FY 1989	FY 1990	FY 1991
$ 150	$ 250	$ 680

NEW PRODUCTION REACTORS

Mrs. Boggs. What is the current total cost estimate for design and construction of two New Production Reactors?

Mr. Tuck. The preliminary total estimated cost for design and construction of two New Production Reactors is $6.8 billion in FY 1988 dollars. A budget quality total estimated cost for construction of the proposed two-reactor strategy currently being pursued will be established when the conceptual designs are completed this summer. The preliminary cost-estimates of $3.2 billion for the Heavy Water Reactor and $3.6 billion for the Modular High-Temperature Gas-Cooled Reactor Plant was derived from reactor technology proponent-provided cost estimates in July 1988 with additional contingency funding added. In addition, the preliminary cost-estimate for Light Water Target Development, National Environmental Policy Act compliance activities and safety review process efforts brings the total preliminary cost-estimate to approximately $7.0 billion in 1988 dollars.

Mrs. Boggs. Should the U.S. determine that the nuclear threat posed by the Soviets has been significantly reduced as a result of political and military changes, are there key decision points at which construction of the NPR can be slowed or halted without undue expenditure of funds? What are those points?

Mr. Tuck. The mission of the New Production Reactors program is to provide new reactor capacity for an assured supply of nuclear materials, primarily tritium, to maintain the Nation's nuclear deterrent capability. Regardless of world events, an assured, safe supply of tritium will be necessary. The New Production Reactors program is in the conceptual design phase and we are concurrently preparing the Environmental Impact Statement for the NEPA process. The final decision as to selected technologies or sites will not be made until the Record of Decision in late 1991. Actual construction of any reactor will not occur until 1993. Until we receive more detailed design, cost and scheduling data, which will be derived from the conceptual and preliminary designs, it would be premature to make any assumption as to where or when construction could be slowed or halted.

ADDITIONAL QUESTIONS FROM MS. BOGGS

THE "PEACE DIVIDEND"

Mrs. Boggs. There is considerable interest in Congress and among the general public to see a real "peace dividend." If Congress were to reduce defense spending significantly, say to $290 billion, what do you think this would do to your program? Where would you start to cut should we limit your resources?

Mr. Tuck. As long as this Country continues to rely on a nuclear deterrent, there is little that can be saved in the Department of Energy. First, the Department's Nuclear Weapons Complex is basically a single-track system and if one process is shut down for any reason, the entire weapons capability is affected. Therefore, a considerable, and rather expensive, modernization effort must be sustained to assure continuity and confidence in the existing nuclear weapons stockpile. Second, even if the production of new weapons is substantially reduced, and the overall stockpile is reduced through a START Treaty, there is still a vast, and very complex, nuclear operations dedicated to maintaining this nation's remaining nuclear stockpile. The Department is strongly committed to operating this complex in a safe, secure, and environmentally acceptable manner. In fact, our FY 1991 budget request was specifically formulated to strengthen management and operations to aggressively pursue compliance with environmental, safety, and health requirements. The largest single increases over FY 1990 are for improving environmental and safety operations, specifically at our Savannah River and Rocky Flats plants. This reflects the culture change Admiral Watkins has indicated is so necessary for the Department. For this change to be successful, significant resources must be dedicated in FY 1991 and beyond to assure that the nation's vital nuclear production operations comply with environmental, safety, and health laws and regulations, and that its facilities are modern, well managed, and technologically advanced.

Therefore, I could foresee some cuts to our Defense Programs budget as being possible only to the extent that Congress directs DOD to reduce or eliminate new weapons systems; however, the savings in the DOE budget would still be small and should be applied to the urgent requirements described above.

I should also point out that some of the options being considered as part of the START Treaty discussions to reduce our nuclear arsenal may actually cause small increases in costs in some areas. Depending on the protocol selected, we would have to disassemble, process and store the nuclear materials from the weapons retired by the Treaty. These actions would put additional pressure on our complex. We are evaluating what the specific effects might be. We will work with the Committee to the extent necessary to coordinate such actions.

The "Peace Dividend"

Mr. Fazio. Historically, the rationale for tactical nuclear weapons in Europe was that NATO couldn't match the Warsaw Pact in conventional forces so we needed nuclear weapons. Now it looks like we're going to have an equal number of U.S. and Soviet military forces in Central Europe, a reunified Germany, and a Warsaw Pact that no one believes is capable of functioning as a military alliance. Isn't it time that we rethought the need for tactical nuclear weapons in Europe? Hasn't the old strategy of flexible response and extended deterrence been rendered obsolete by events?

Dr. Barker. The role of nuclear weapons in Europe has been subject to continuing examination over the years. The impact of recent events in Europe is being evaluated as NATO examines the number and kind of nuclear weapons which will be necessary in the future. At this time, the United States, for its own needs, and NATO continue to believe the flexible response and extended deterrence play an important role in maintaining a stable international environment. The traditional roles of tactical nuclear weapons--contributing to deter conventional attack, serving as a fundamental component of our deterrent to Soviet nuclear use, providing linkage to the U.S. strategic deterrent--will remain valid in an environment of conventional parity.

Mr. Fazio. Wouldn't you agree that there's just no way that the Germans are going to accept deployment of short-range nuclear weapons on their soil? Why should Congress spend another penny on W82, FOTL, or SRAM-T when Germany is never going to allow them to be deployed?

Dr. Barker. Short-range nuclear weapons are now deployed on German soil, and current plans incoporate continued deployment. Clearly, events of the last year in eastern Europe have affected political support in both Europe and the United States for FOTL deployment in Europe. NATO Ministers, however, as recently as November 1989, publicly reiterated their support for U.S. efforts to maintain a credible nuclear deterrent posture. Furthermore, they recognized the value of U.S. and U.K. efforts toward fulfilling identified modernization requirements, including FOTL, in order to provide the basis for timely and appropriate Alliance decisions. German officials and the NATO Secretary General have recently reaffirmed their support for the 1992 decision on FOTL deployment.

Theater Nuclear Forces (TNF), and these three systems in particular, support all of NATO, not just Germany. It is a U.S. decision at the request of the host country to provide these weapon systems for U.S. soldiers who have commitments to respond to security emergencies on a worldwide basis.

Status of Weapons System

Mr. Fazio. I see that in addition to continuing funding Research and Development, DOE is asking us for $15 million this year to initiate a $95 million construction project for SRAM-T production facilities (see page 39, DOE Construction Project Data Sheets) and $3.5 million to initiate a $45 million construction project for Follow-on-to Lance production facilities (see page 98 of the Data Sheets). Isn't it a bit premature to be building production facilities for these weapons, when your own budget documents say that SRAM-T and FOTL are still only in Phase 3 engineering development and it now looks as if prospects for their eventual deployment are in serious doubt?

Dr. Barker. *Deleted*

SACEUR has indicated that initial delivery of these weapons in *Deleted* is absolutely essential to meeting critical modernization goals. To support these *Deleted* requirements, the Department of Energy must upgrade its production capability beginning this year due to the long lead time necessary for construction of these facilities. Any lack of effort will jeopardize the DOE's ability to support SACEUR and DOD needs.

Mr. Fazio. Every year I ask you whether the Europeans are ready to accept W82 deployment and every year you say they generally support it but they haven't officially accepted them yet. When do you intend to reach a formal, specific agreement on deployment? Do you still want to go over the 925 cap on the W82, and if so, why?

Dr. Barker. It still is uncertain when official bilateral agreements, Programs of Cooperation, will be reached with NATO member nations regarding the W82. The current CINC requirements *Deleted* *Deleted* should requirements for the W82 change in the future, the cap will be readdressed.

Mr. Fazio. I understand that the SRAM-T has a range *Deleted* kilometers and that it would be deployed on the F-15E. Wouldn't this system have the range to reach targets inside the Soviet Union? Doesn't that make SRAM-T a

Mr. Tuck.

Deleted

Mr. Fazio. Have warheads been chosen for the SRAM-T and FOTL? Which laboratory was chosen and how many of the warheads will be needed? What yield will the SRAM-T and FOTL and warheads have? Will there be a common warhead for SRAM-T and the FOTL (Follow-on to Lance)? Could a ground-launched SRAM-T be used in place of a FOTL?

Mr. Tuck. Yes, a Los Alamos National Laboratory, Sandia National Laboratories common warhead was selected for SRAM-T and FOTL. The total number of warheads is *Deleted* The common warhead provides a savings in the number of shared quality assurance and reliability test (QUART) units. Namely, if one system were canceled, the other would require twice as many QUART units. With respect to the question of whether or not a ground - launched SRAM-T could be used in place of a FOTL, the Army FOTL missile system is currently moving into source selection. The Army has requested that we not bias the source selection one way or the other since specification of the SRAM-T for FOTL would give an edge to the SRAM-T contractor. The DOE common warhead has been designed to work in any system that meets the FOTL requirements in the request for proposal.

SRAM-T AND FOTL PROGRAMS

Mr. Fazio. Given the developments which have occurred in Europe over the last year, isn't there little or no prospect for deployment of SRAM-T and FOTL in Germany? Why couldn't we put these programs on hold?

Dr. Barker. Short-range nuclear weapons are now deployed on German soil, and current plans incoporate continued deployment. Clearly, events of the last year in eastern Europe have affected political support in both Europe and the United States for FOTL deployment in Europe. NATO Ministers, however, as recently as November 1989, publicly reiterated their support for U.S. efforts to maintain a credible nuclear deterrent posture. Furthermore, they recognized the value of U.S. and U.K. efforts toward fulfilling identified modernization requirements, including FOTL, in order to provide the basis for timely and appropriate Alliance decisions. German officials and the NATO Secretary General have recently reaffirmed their support for the 1992 decision on FOTL deployment.

Theater Nuclear Forces (TNF), and these three systems in particular, support all of NATO, not just Germany. It is a U.S. decision at the request of the host country to provide these weapon systems for U.S. soldiers who have commitments to respond to security emergencies on a worldwide basis.

Mr. Fazio. What is the total number of SRAM-T and FOTL warheads scheduled to be produced? Which of these -- the SRAM-T or the FOTL -- have highest priority?

problem from the perspective of the START Treaty (in other words, isn't it a kind of end-run around the START limits)?

Dr. Barker. The Short Range Attack Missile-Tactical (SRAM-T) Weapon launched from the F-15E tactical aircraft could reach limited areas within the Soviet Union flying from forward NATO bases. START provisions do not apply to air-to-surface missiles with the range of TASM nor to aircraft intended to carry this missile.

Mr. Fazio.

Deleted

Mr. Tuck.

Deleted

Mr. Fazio. There have been reports indicating that the SRAM-II problem is experiencing delays. Are these delays effecting the SRAM-T program? What is the effect on the schedule for development, IOC (Initial Operational Capability) and FOC (Full Operational Capability)?

Mr. Tuck. The SRAM-II program was delayed *Deleted* *Deleted* This delay was in response to *Deleted* *Deleted* and Congressional elimination of funding for B1-B integration during FY 1990.

The delay in SRAM-II will not directly affect the continued development of SRAM-T. Currently, warhead development has been assigned to Los Alamos and Sandia Laboratories and the program will shortly proceed into Engineering Development.

Deleted

There are currently no delays in the SRAM-T program due to the SRAM II program. The DOD stated in the Acquisition Decision Memorandum for SRAM-T milestone II that SRAM-T could not proceed through a Preliminary Design Review until SRAM II completes their Critical Design Review (CDR). If the SRAM II is not able to complete CDR on schedule, there will probably be a day-for-day slip in all the DOE schedules.

Mr. Fazio. Last year, Congress fenced funding for construction of production facilities for the FOTL until you certified that an existing warhead -- such as the W84 or W85 -- could not be used for these systems. I see in this year's budget, you have again requested funding for FOTL production facilities. Please explain why this is the case and if you have determined that existing warheads cannot be used in the FOTL.

Mr. Tuck. The language last year fencing the funds specified that the Department of Defense certify to the Department of Energy that existing hardware could not be used. A Phase 2 warhead feasibility study was conducted and results presented to the Nuclear Weapons Council.

Deleted

The funding

is requested in the FY 1991 budget because of the long time involved in the acquisition of specialized equipment items. The line item essentially provides for replacement facilities and equipment projected to need replacement to assure capacity to produce the FOTL warheads. A lesser portion of the capital funding will be used to acquire the assets to produce the non-physics components of FOTL which are unique and not a duplication of the SRAM-T warhead.

NEW WARHEAD/BOMB PROGRAMS

Mr. Fazio. Please provide a chart listing all current warheads which are expected to enter into or continue in Phase 1 (Concept Definition) and Phase 2 (Feasibility Study) and Phase 2A during FY 1990 and FY 1991.

Mr. Tuck. The answer is included in a table, which I would like to insert in the record. (The information follows:)

WEAPONS ENTERING PHASES 1, 2, and 2A

	FY 1990	FY 1991
PHASE 1		
PHASE 2	Strategic Earth Penetrating Weapon (SEPW)	
PHASE 2A	Short Range Attack Missile-Tactical Follow-on-to-Lance	SEPW (if approved)

Mr. Fazio. Please provide a chart indicating which systems will enter into or continue in Phase 3 (preliminary engineering and design) during FY 1990 and FY 1991.

Mr. Tuck. The answer is included in a table, which I would like to insert in the record. (The information follows:)

PHASE 3 WARHEAD DEVELOPMENT

	FY1990	FY1991
PHASE 3	IEPW SRAM-II (W89) NDSB (B90)	SRAM-T FOTL

KEY:	
SRAM-II	SHORT RANGE ATTACK MISSILE-II
NDSB	NUCLEAR DEPTH STRIKE BOMB
IEPW	INTERIM EARTH PENETRATING WEAPON
SRAM-T	SHORT RANGE ATTACK MISSILE-TACTICAL
FOTL	FOLLOW-ON-TO LANCE

Mr. Fazio. An article in the July 23, 1989, Los Angeles Times by Bob Toth speaks of consideration "being given to building a 22-megaton weapon." Is there, or was there, any truth to this? If so, what happened?

Mr. Tuck. The highest yield warhead currently in the inventory is the B-53, *Deleted*

Mr. Fazio. According to your budget submission (Volume 1, page 32), you will be supporting a Strategic Relocatable Target Study (system to locate and destroy Soviet mobile missiles) in both FY 90 and FY 91.

Deleted

Do you now know how to do that? If not, why are we proceeding?

Mr. Tuck. The technology required to locate and track enemy missiles is primarily the responsibility of the DOD. However, DOE laboratories have been assisting the DOD with sensor improvement and definition studies. This will be supported by the weapon development study funds. If these efforts are successful, DOD will have to determine whether or not a Phase 2 warhead study should be initiated and a nuclear weapon system be developed to attack Strategic Relocatable Targets.

Mr. Fazio. According to your budget submission (Volume I, page 32) you will be supporting studies on a Hypervelocity Glide Vehicle. What is the justification for this project? What is the current schedule for Phase 1, Phase 2, and Phase 2A? What activities are planned for this project during FY 1990 and FY 1991?

Mr. Tuck. The Defense Advanced Research Projects Agency manages the program for the Department of Defense. DOD formally asked DOE to assist in this project. DOE laboratories supported the DOD in two areas; warhead and airframe. The warhead studies are complete, although the final report still needs to be reviewed and it is expected to be published this fiscal year. DOD has several prime contractors studying the airframe and Oak Ridge has been a tremendous help to the project. The contractors do not have the expertise with

Deleted

There is not a firm schedule for acquisition phase points, although a formal Phase 1 is expected in FY 1991 and the Air Force planning date to field the weapon is *Deleted*

Deleted

Mr. Fazio. According to your budget submission (Volume 1, page 32), you will be supporting studies on Maneuvering Reentry Vehicles (MARV) during FY 1990 and FY 1991. What is the justification for this project? What is the current schedule for Phase 1, Phase 2, and Phase 2A? What activities are planned for this project during FY 1990 and FY 1991?

Mr. Tuck. The only activity planned for the Maneuvering Reentry Vehicles program is a paper study. There are no experimental activities planned for FY 1990 or FY 1991, nor is it scheduled to have a Phase 1, Phase 2, or Phase 2A.

Mr. Fazio. According to your budget submission (Volume 1, page 32), you will be supporting studies on a new type of AntiSubmarine Warfare (ASW) Weapon during FY 1990 and FY 1991. What is the justification for this project? How does this differ from the ASW ND/SB (Nuclear Depth/Strike Bomb)? What is the current schedule for Phase 1, Phase 2, and Phase 2A for this new ASW weapon? What activities are planned for this project during FY 1990 and FY 1991?

Mr. Tuck. The only activity planned for these supporting studies on a new type of Anti-Submarine Warfare Weapon is a paper study. There are no experimental activities planned for FY 1990 or FY 1991, nor is it scheduled to have a Phase 1, Phase 2, or Phase 2A.

Mr. Fazio. What ever happened to the two other ASW systems under study a few years ago that never proceeded to Phase 3? Are these being revived?

Mr. Tuck. The two systems you are referring to are the Sea Lance ASW/Stand Off Weapon, and the ASW/vertical launch weapon. Both of these systems were deleted from the DOD budget and are not anticipated to be revived. The Sea Lance warhead was deleted in FY 1988, and the ASW/VLA warhead was deleted in FY 1986.

Mr. Fazio.

Deleted

Mr. Tuck.

Deleted

Deleted

Deleted

Mr. Fazio. In last year's hearing you listed a LOBFA (Low Observable Bomb for Aircraft) being in Phase 1 in FY 1991. Will Phase 1 work continue on a LOBFA in FY 1991? Please explain what this bomb is and who specified a need for it.

Mr. Tuck: Two years ago, during preparation for the DOD 1989 Nuclear Weapons Development Guidance, Air Staff made a request that DOE look at weapon technology incorporating low observable technology. Such technology was needed to mate with low observable aircraft. There were other indications during this Nuclear Weapons Development Guidance preparation that Strategic Air Command might have use for such technology during the 1992 time frame. To highlight this possible need, LOBFA was placed in the planning documentation.

Since then, there has been no interest expressed by the Air Force for initiating a Phase 1 so LOBFA has now been dropped from the budget.

EARTH PENETRATING WARHEAD

Mr. Fazio. Where are we with the Earth Penetrating Warhead Program?

Mr. Tuck. The Department of Energy has completed a Phase 2A weapons design and cost study with the Department of Defense for an interim earth penetrator warhead capability, and is preparing for Phase 3 preliminary engineering and design.

Additionally, the DOE is participating in a Phase 2 study with DOD to identify rigid-body earth penetrator warhead for application to long-term solutions to cover the deeply buried targets in the Soviet Union.

Mr. Fazio. Please describe the tests done at the Tonopah Test Range with the EPW. How many have been done? What have we learned?

Mr. Tuck. The Earth Penetrating Warhead, EPW, program dates back into the 1960's and the Tonapah Test Range, TTR, has been used for many of the tests. The result of the early program was the development of the tactical Pershing II EPW. *Deleted*

The recent interest in strategic EPWs has also utilized the TTR. To date there have been approximately 50 tests at TTR for the strategic system. Both air drop and

Davis gun tests have been performed at TTR for the EPW programs. In air drop tests a full scale penetrator shape is released from an aircraft or helicopter by either free-falling or rocket assisted to achieve the proper impact conditions. Davis gun tests involve a recoilless cannon firing a scaled or full size, assuming it will fit within the tube and not exceed the mass limitations, earth penetrator shape into the ground. The TTR has several advantages over other ballistics ranges in that the geology is consistent over a large area and there are a variety of types of geology over the entire range. However, there are some special conditions which can't be met there and penetration tests are done elsewhere, e.g. frozen tundra like soil. Computer simulation has come a long way in perfecting the EPW designs; however, testing is required to certify the answer of the code. Penetrator nose shape, angle-of-attack, impact angle, impact velocity, length-to-diameter ratio, peak loading, target hardness limitations, stability, and terradynamics have all come out of the testing at TTR.

The goal of the current long term strategic EPW program is to develop a weapon which will satisfy the needs of the Department of Defense well into the 21st century. In order to do this, the EPW must be able to penetrate a variety of targets including rock and ice plus the mass needs to be as low as possible. Many additional tests will need to be conducted in the future to assure survivability and reliability of the weapon. The Department of Energy foresees the continuing use of TTR for the EPW.

Mr. Fazio. *Deleted*

Mr. Tuck. *Deleted*

Mr. Fazio. The Office of Technology Assessment report The Containment of Underground Nuclear Explosions concluded that "As the secrecy associated with the testing program is largely ineffective in preventing the dissemination of information concerning the occurrence of tests, the justification for such secrecy is questionable." The report goes on to say that "public concern over the testing program could be greatly mitigated if a policy were adopted whereby all tests are announced." Is the DOE considering a policy change that would: 1) announce all past unannounced tests, and 2) announce all future tests? If not, why not?

Mr. Tuck. We are reviewing nuclear test public announcement policy and will be providing recommendations to the Secretary shortly.

Mr. Fazio. The reason sometimes given for not announcing all tests is that "we don't want to make it easy for any adversary to gather intelligence." Given the fact that *Deleted* tests are known to have occurred, what possibly could be compromised by announcing past or future tests? What is it exactly that is being made "easy" by announcing a test, or being hidden by not announcing one? Would you please explain in detail the reasoning behind such statements and how it outweighs the public's concern about secret testing.

Mr. Tuck. The Department of Energy does not consider it unreasonable to withhold from potential adversaries an advance timetable of nuclear testing activities that could aid in their monitoring of our nuclear weapons tests. Confirmation of the completion of some activities could be useful, as well. The Department's nuclear test announcement policy has always made specific provision for the needs of public safety and taken into consideration public sensitivities. However, it is the government's responsibility to safeguard information that may be helpful to an adversary. As conditions have changed and the population has grown around the Nevada Test Site, the Department's test announcement policy has been reviewed and modified in the past. We are currently involved in such a review.

WARHEAD RETIREMENTS

Mr. Fazio. Please provide a table containing the following information about the B28 and B43 bombs, the W44 ASROC, W55 SUBROC, W45 Terrier, and W31 Nike Hercules: 1) how many are now left with operational forces, 2) when all of these are scheduled to be retired (month/year). If any have already been retired from operational forces, please indicate when they were returned to DOE custody and what the scheduled date is for completion of Phase 7.

Mr. Tuck. The information is provided in a table that I would like to insert for the record. (The information follows:)

OPERATIONAL/RETIREMENT STATUS

	B28	B43	W-44	W-55	W-45	W-31
Number Operational						
Retirement Date (no later than)			*Deleted*			
Returned to DOE						
Phase 7 End (no later than)						

---

*scheduled date

Mr. Fazio. What are the current plans for the W84 and W85 warheads for the GLCM and Pershing II missiles? Where are these warheads now stored? Will either of these warheads be used on new delivery systems, as previous testimony by DOD and DOE witnesses has indicated was possible? Given the current problems with the production complex, is there a need for the materials in these warheads?

Mr. Tuck. *Deleted*

WARHEADS/BOMBS IN PRODUCTION

Mr. Fazio. When are the W80 warheads scheduled to be produced for the Advanced Cruise Missile? Over what period of time are they to be built?

Mr. Tuck. Production commenced FY 1990 and is currently scheduled to continue through *Deleted*

Mr. Fazio. In what month did Phase 6 begin for the W88?

Mr. Tuck. Phase 6 for the W88 commenced in June 1989.

Mr. Fazio. What is the difference between the W87-0 and the W87-1?

Mr. Tuck. The difference between the W87-0 and the W87-1 is that the W87-0 has *Deleted* The W87-1 has been designed for use with the Small ICBM missile system, also known as Midgetman.

Mr. Fazio. What modifications (if any) would have to be made to adapt the W87 for the rail garrison system on the MX missile?

Mr. Tuck. At this time, no changes are planned to adapt the W87 warhead on the MX missile for rail garrison basing. However, extensive environmental testing is currently being conducted to confirm the safety and longevity of the warhead in this new basing mode. If testing establishes any requirement for changes, they will be incorporated during rebasing.

Mr. Fazio. When is the B90 scheduled to be produced? Over what period of time are the B90s to be produced? How many will be produced in total?

Mr. Tuck. *Deleted*

Mr. Fazio. How much longer is the B61-3,4 scheduled to be produced?

Mr. Tuck. *Deleted*

Mr. Fazio. How much longer is the B83 scheduled to be produced?

Mr. Tuck.

Deleted

W82 155MM NUCLEAR ARTILLERY SHELL

Mr. Fazio. How many W82 shells do you plan to produce, and how many W79 shells have you already produced? Are you still seeking lifting of the Nunn-Johnston 925 cap on AFAP (Artillery Fired Atomic Projectile) production? If so, please explain why.

Mr. Tuck. We are planning to produce Deleted W82 projectiles for Department of Defense use. We have produced Deleted W79 projectiles for the DOD previously. The question concerning the 925 ceiling could be more appropriately responded to by the DOD; however, from the Department of Energy perspective, it would be highly desirable to replace all of the W48 projectiles with modern weapons, such as the W82, which incorporate state-of-the-art safety and security features.

Mr. Fazio. Given the changes that have taken place in Europe in the last year, aren't the prospects for German acceptance of further AFAP deployments slim to nonexistent? Why should we proceed with further funding for the W82, given this situation?

Dr. Barker. Proposed deployment of AFAPs to Germany, or any other NATO country, will be negotiated with that country's government. Requirements for AFAPs to support non-U.S. NATO Forces continue to exist and the NATO member governments have not rejected them.

The W82 is being built to fulfill requirements from theater CINCs worldwide, as well as NATO Allies, in addition to the Germans.

For these reasons, continued funding is requested.

Mr. Fazio. In what month and year is the W82 now scheduled to begin Phase 5 (preproduction) and 6 (full-scale production)? Does this represent a delay in previous plans, and if it does, please explain the reasons for the delay?

Mr. Tuck.

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Mr. Fazio. Over what period of time are the W82 AFAPs to be produced? How many are to be produced? When will the first W82s be deployed in Europe?

Dr. Barker. W82 AFAPs are scheduled for production during the *Deleted*

Deleted time period. The number of W82 AFAPs scheduled for production *Deleted* The deployment plan for W82 AFAPs has not yet been determined; therefore, the time of deployment to Europe is currently unknown.

Mr. Fazio. How many W48 AFAPs are still

Deleted

Dr. Barker. There are

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Some will be withdrawn for quality assurance and reliability testing each year (a random sample is taken from the entire stockpile). We plan to retire the W48 AFAPs as W82 AFAPs become available.

Mr. Fazio.

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Dr. Barker.

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NUCLEAR STOCKPILE

Mr. Fazio. The size of the stockpile has been decreasing due to the greater number of retirements than new builds. By what percentage has it decreased since 1980? By what percentage has it decreased since 1985? Historically, with what prior year in the late 1950s or early 1960s would the current stockpile be equivalent to?

Mr. Tuck.

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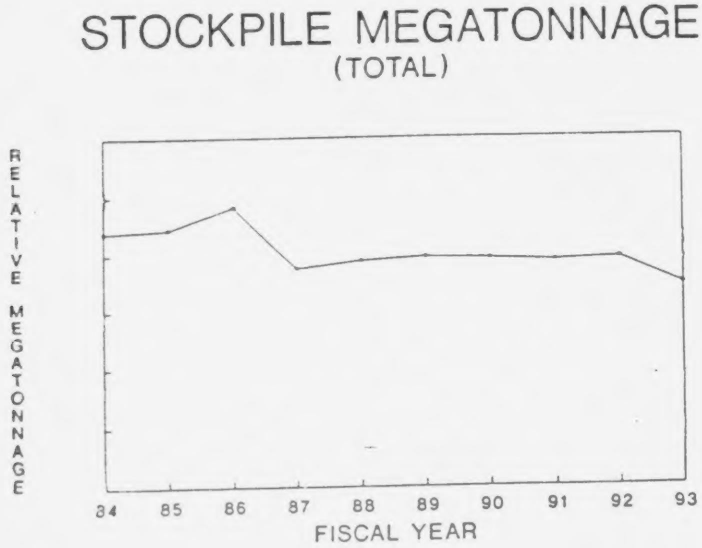
Mr. Fazio. In last year's hearing (page 505) you provided me with an unclassified graph of the stockpile trends for the period 1965 to 1989. This graph was based on an unclassified graph which appeared in a 1976 Joint Committee on Atomic Energy Report, which showed trends in the stockpile between strategic (offense and defense) nuclear weapons and tactical nuclear weapons. This year, would you please provide a chart, in unclassified form, which provides the same information for the period 1946 to 1966. With regard to strategic weapons, indicate what portion of the total are strategic offensive and what portion are strategic defensive.

Mr. Tuck. The information you requested can not be provided in an unclassified response. We were able to provide a "snapshot" beginning with 1965 last year because it did not provide too much "reference" information. Starting the data with 1946 provides a "complete" picture.

Mr. Fazio. Has total megatonnage gone up or down since 1984? By what percentage? Is it planned to increase or decrease over the next five years? In past years, graphs have been presented in hearings depicting the historical megatonnage trends (See for example, Part I of FY 1985 SASC Hearings, pages 122-123, and Part 7 of House E&W Subcommittee Hearings, page 709). Could you update these charts to FY 1990, project them out to FY 1991, FY 1992, and FY 1993, and present them in the same unclassified form they appeared in the above hearings.

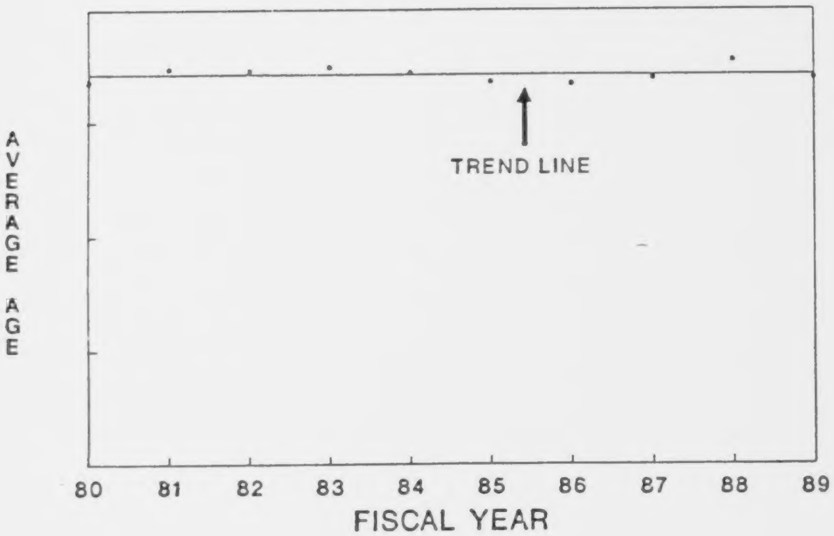
Mr. Tuck. Total megatonnage has decreased by 4.3 percent since 1984. It is planned to decrease by 5.0 percent from FY 1989 to FY 1993. A chart depicting the information is provided for the record. (The information follows:)



Mr. Fazio. Routinely you used to provide the average age of the stockpile? In last year's hearing this information was not available in unclassified form. Isn't this information unclassified? Please provide the average age of the stockpile at the end of the last ten calendar years? Is there a trend and if so, what does it indicate?

Mr. Tuck. Numerical data on the average age of the stockpile cannot be provided without inferring classified information on annual production rates. I will provide for the record a chart of the stockpile age profile for the last ten years showing an essentially level trend. (The information follows:)

STOCKPILE AGE



Mr. Fazio. How many different weapon types are in the current stockpile? What was the most types we ever had at one time in the stockpile, and what year did this occur?

Mr. Tuck. The current stockpile contains 25 different weapon types. The 1983 and 1984 stockpiles had the most weapon types, with 29 different warheads in those years.

Mr. Fazio. Please provide, in unclassified form (as it has been provided in previous hearings) with the dates when the last ten Nuclear Weapons Stockpile Memoranda were signed by the President.

Mr. Tuck. The dates are in a table. I would like to insert for the record. (The information follows:)

Nuclear Weapons Stockpile Memorandum
Presidential Signature Dates

NWSM	Signature Date
FY80	27 FEB 80
FY81	24 OCT 80
FY82	17 MAR 82
FY83	18 NOV 82
FY84	16 FEB 84
FY85	11 FEB 85
FY86	4 MAR 86
FY87	9 JAN 87
FY88	13 JUN 88
FY89	19 JAN 89

NUCLEAR TESTING/PRODUCTION BUDGETS

Mr. Fazio. Provide the total annual budgets for nuclear explosive testing for the last ten years and your future projections for the next five. In a separate column list the DOD/DNA share.

Mr. Tuck. I will provide a table for the record showing DOE data. I want to point out, however, that the Fiscal Year 1992-1995 estimates are simply a projection of the FY 1991 level. A separate response by DOD/DNA will list the budgets for its appropriation.

NUCLEAR EXPLOSIVE TESTING BUDGETS
($ IN MILLIONS)

FISCAL YEAR	DOE
1981	$ 329.9
1982	$ 389.9
1983	$ 446.9
1984	$ 560.0
1985	$ 618.6
1986	$ 588.8
1987	$ 618.8
1988	$ 595.2
1989	$ 571.7
1990	$ 562.1
1991	$ 575.5
1992	$ 598.6
1993	$ 622.5
1994	$ 647.4
1995	$ 673.3

Mr. Fazio. How much has DOE, ERDA, and AEC spent (using the Atomic Energy Defense Activities function) on developing and producing nuclear weapons since 1960. Please provide the annual amounts in current and constant (FY 1991) dollars.

Mr. Tuck. I am inserting a table for the record that lists the amount spent on research, development, and testing; production and surveillance; and nuclear materials production from FY 1960 through FY 1990 and our request for FY 1991. (The information follows:)

COSTS FOR DEVELOPMENT AND PRODUCTION OF
NUCLEAR WEAPONS
(DOLLARS IN MILLIONS)

YEAR	TOTAL CURRENT DOLLARS	TOTAL CONSTANT DOLLARS
1960	$ 901	$ 4,150
1961	906	4,136
1962	1,058	4,792
1963	1,135	5,052
1964	1,134	4,983
1965	1,066	4,626
1966	987	4,163
1967	983	4,023
1968	1,112	4,362
1969	1,286	4,796
1970	1,170	4,116
1971	1,138	3,836
1972	1,157	3,780
1973	1,209	3,718
1974	1,134	3,140
1975	1,126	2,857
1976	1,284	3,080
1977	1,461	3,294
1978	1,713	3,586
1979	1,989	3,740
1980	2,318	3,839
1981	2,938	4,409
1982	3,902	5,519
1983	4,634	6,357
1984	5,288	6,956
1985	5,961	7,569
1986	6,126	7,631
1987	6,026	7,242
1988	6,033	6,963
1989	6,161	6,800
1990 Estimate	6,642	7,007
1991 Estimate	7,161	7,161

SUPERCOMPUTERS

Mr. Fazio. Please list the number and types of Cray computers at Los Alamos, Livermore, and Sandia. How many and what types of supercomputers are to be delivered to each of these three laboratories during FY 1990 and FY 1991.

Mr. Tuck. A list regarding currently installed and planned acquisitions is provided for the record. (The information follows:)

SUPERCOMPUTERS

		Planned	
	Current	FY 1990	FY 1991
LANL:	CRAY XMP-24 CRAY XMP-48 CRAY XMP-416 (2) CRAY YMP8/832	a) YMPs to replace all XMPs b) Upgrade existing YMPs	Class VII Supercomputer
LLNL:	(2) CRAY 1 CRAY XMP-48 CRAY XMP-416 CRAY YMP8/832	a) Upgrade existing YMPs b) Acquire additional YMP supercomputer as interim to Class VII	Class VII Supercomputer
SNL:	(2) CRAY 1 CRAY XMP-24 CRAY XMP-416 CRAY YMP8/264	a) Acquire additional YMP supercomputer	Upgrade YMP systems

Mr. Fazio. Are there any other types of supercomputers other than the Cray either already at the laboratories or on order? I would be especially interested in any manufactured by Fujitsu LTD., Hitachi Ltd., and the NEC Corporation. (There is concern that our DOE weapons dollars are helping to finance the development of the Japanese supercomputer industry.)

Mr. Tuck. Other types of supercomputers are acquired at the national laboratories for computational research utilizing massively parallel achitectures. Currently, installed systems include Thinking Machines CM-2 at Los Alamos National Laboratory, NCUBE systems at Sandia National Laboratories and a Bolt Beranek and Newman TC2000 at Lawrence Livermore National Laboratory.

No supercomputers manufactured by Japanese firms are currently installed, nor do plans exist to acquire any.

WEAPONS PRODUCTION

Mr. Fazio. With the Rocky Flats Plant closed down, does that mean that we are not producing any new nuclear weapons or dismantling old ones?

Mr. Tuck. No it does not. Although the production of plutonium pits has temporarily stopped due to suspension of plutonium operations at Rocky Flats. we are still producing nuclear weapons.

Deleted

Mr. Fazio. The FY 1990 budget request indicated that the Combined Device Assembly Facility would be finished in the second quarter of FY 1991.

What is the current estimate when this facility will be completed. What are the plans for the Baker and Able facilities in Area 27?

Mr. Tuck. The Combined Device Assembly Facility construction will be completed in the first quarter of FY 1992. The facility is expected to be fully operational by May 1992. The additional time required to complete construction is for additional security door design and installation.

The Baker and Able facilities in Area 27 will no longer be needed for device assembly functions after the Combined Device Assembly Facility becomes operational. Alternative uses are now being studied. If no suitable alternate user is found, the two facilities will be put on standby status.

Mr. Fazio. Which weapons are in the Stockpile Improvement Program?

Mr. Tuck. The current weapons in the Stockpile Improvement Program are all B61 series bombs. They are the B61-6,8, and 9 tactical bombs and the B61-7 strategic bomb.

Mr. Fazio. I see that funding for NDEWs is slated to decline from $214 million in FY 1990 to $191 million in FY 1991. This is the first time since President Reagan's Star Wars speech in 1983 that you will have requested less funding for NDEW than Congress appropriated in the pervious year. Does this indicate that NDEW has a declining importance to the SDI program? What impact will the lower funding level have on the NDEW program?

Mr. Tuck. The funding level requested for Nuclear Directed Energy Weapons, NDEW, in the FY 1991 budget does not reflect a declining importance to the Department of Energy's effort related to these concepts. We continue to believe that this is a vital mission that will assess the potential threat to the country, should an adversary succeed in deploying NDEW concepts.

The lowered funding levels have delayed previous schedules associated with most NDEW concepts by approximately one year. The requirements to meet other high DOE priorities such as environmental, health, and safety issues forced a decision to reduce funding in other areas. The year delay in NDEW programs should not be construed as reduced interest in nuclear threat assessment or in supporting the Strategic Defense Initiative.

Mr. Fazio. Your budget submission (Volume 1, pages 37-38) indicates that in FY 1991 a "significantly scaled-back program will continue at a much less than technology-limited pace due to budget constraints." Will XRL UGT tests be delayed? Do you plan to put more emphasis on research using above-ground facilities, as the budget submission seems to suggest?

Mr. Tuck.

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Mr. Fazio. What is the current status of the FALCON and Centaurus programs?

Mr. Tuck. Both the FALCON and Centaurus programs will be conducting a series of key experiments this spring.

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Mr. Fazio. Please provide a table listing total funding for NDEWs since the inception of research on these technologies. In a separate table, project funding for NDEWs for the next five fiscal years.

Mr. Tuck. The requested tables are included for the record. (The information follows:)

NDEW FUNDING SINCE RESEARCH PROGRAM INCEPTION
(DOLLARS IN MILLIONS)

FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
$118.0	$215.0	$235.1	$349.0	$279.0	$240.3	$214.4

PROJECTED NDEW FUNDING
FY 1991 - FY 1995
(DOLLARS IN MILLIONS)

FY 1991 (REQUEST)	FY 1992	FY 1993	FY 1994	FY 1995
$191.9	$199.6	$207.0	$214.0	$220.6

Mr. Fazio. When do you now think that feasibility objectives for X-ray lasers, hypervelocity projectiles, and optical frequency laser concepts will now be achieved?

Mr. Tuck. The technical feasibility for these concepts, from a threat assessment standpoint, is as follows: *Deleted*

It is also important to point out the difference between proof of concept and feasibility. Proof of concept means we can demonstrate, on a rough scale, the phenomenology involved with these concepts. Feasibility means we have been able to resolve key technical issues, such as scaling and beam quality, that allows us to have confidence in the feasibility of an adversary being able to weaponize these concepts.

LAB CONSOLIDATION

Mr. Fazio. According to an article that appeared in The New York Times on February 2, 1990, consideration was now being given to consolidating the weapons design and development function at one laboratory. Is this report accurate? What is being considered? What plans are being considered for LLNL?

Mr. Tuck. The Modernization Study submitted to Congress in January 1989, 2010 Report, found that consolidation of the national weapons laboratories would not be cost-effective. Instead, it would be counterproductive by limiting the technology base and by eliminating the benefits of peer review and competition of ideas and designs.

A Modernization Review Committee has been appointed to review the findings and recommendations of the "2010 Report" along with the basic assumptions that underlie the report. They will report to the Secretary later this year with their recommendations for the modernization plan.

VERIFICATION AND CONTROL TECHNOLOGY - ARMS CONTROL

Mr. Fazio. I see that DOE's budget request would cut funding for verification efforts related to the Threshold Test Ban and Peaceful Nuclear Explosions Treaties, special nuclear materials, and conventional and chemical weapons by $16 million. What is the justification for such cuts, given the fact that the U.S. and the Soviets are supposed to sign a verification protocol for the TTBT and PNET in June and complete CFE and chemical weapons treaties within the next year? Is DOE no longer interested in supporting this kind of research? Do you believe that funding responsibility for it should be transferred to another agency, for example ACDA or DOD?

Mr. Tuck. Arms control is an important aspect of U.S. national security. The justification for reduction of funding for verification efforts can only be related to higher priority choices at DOE. Nevertheless, we believe that the DOE should continue to support this kind of research, and that the DOE can provide national-level development of technologies and systems for the verification arms control treaties. The DOE has the structure, planning, technical capabilities, and interest to continue in this research and development which has been ongoing for over a quarter of a century, and merits the continued and appreciated support of Congress through funding of these activities.

Mr. Fazio. Your budget request (Volume 1, pages 243 and 244) states that your on-site monitoring budget is being cut by 35 percent and that "preparation of personnel and equipment support for verification of TTBT/PNET will continue at a reduced level." Why would you reduce funding for these activities, when the Administration has championed the CORRTEX technology supported under this program as the preferred method for TTBT/PNET monitoring? Does this indicate that less emphasis will be placed on CORRTEX in actual monitoring of the TTBT and PNET?

Mr. Tuck. Because of the uncertainties of the treaty negotiation process at the time of the budget's preparation and because the technology development of CORRTEX for the Threshold Test Ban Treaty, TTBT, and Peaceful Nuclear Explosions Treaty, PNET, is mature; the funding requested has been reduced for technology development. No funding has been requested for TTBT/PNET verification implementation. Should implementation requirements become a reality during the budget period, additional funding would be required since there is only minimal implementation preparation funding in this research and development budget request. We believe the Administration's intention is to initially use CORRTEX on all tests where that right is reserved.

Mr. Fazio. I see that your request for seismic verification is being cut, delaying fabrication of the Deployable Seismic Verification System. What is the justification for this cut?

Mr. Tuck. We have essentially completed the fabrication of the first five units of the Deployable Seismic Verification System, and, although we had planned on beginning construction of the second set of five units, we felt that a reduction in funding could better be absorbed through reduced hardware production compared to reduced seismic research and development activities. In general, we believe that the maintenance of the technical expertise of laboratory personnel is our most serious responsibility.

Mr. Fazio. What is the current status of the Nuclear Test Ban Readiness Program? When will you be submitting the report requested in the Senate Armed Services Committee report on the FY 1990 budget?

Mr. Tuck. The Department's first annual report to Congress on the Program Status of Preparations for Further Limitations on Nuclear Testing was completed and sent to the Senate and House Armed Service Committees on February 23, 1990. We expect to complete our Remanufacturing Study in July 1990. This report will be made available to the Congress when completed. We want to complete this study before further remanufacturing analyses are initiated.

Mr. Fazio. In the past, both the Reagan and Bush Administrations have stated that we could have a CTB when: (1) there had been substantial reductions in strategic nuclear weapons; (2) we had redressed the conventional force imbalance in Europe and had improved confidence building measures; and, (3) nuclear weapons played a less important role in the world. haven't we either achieved--or are on the verge of achieving--all of these conditions? Why can't we now immediately proceed to negotiate a CTB once the TTBT and the PNET treaties are ratified?

Mr. Tuck. We have stated that a comprehensive test ban, CTB, remains a long-term goal of the United States. A CTB must be viewed in the context of a time when we do not need to depend on nuclear deterrence to ensure international security and stability.

And so, despite recent changes in the European political climate, and despite the exciting and rapidly-paced arms control agenda, the U.S. still relies fundamentally on nuclear deterrence for its national security. As we have said many times, as long as nuclear weapons play a critical role in our national security strategy, we must be free to conduct nuclear tests to ensure the credibility of our forces.

Mr. Fazio. In the past, you promised Congress that once you had a new verification protocol for the TTBT and the PNET, you would immediately proceed to negotiate a CTB. Now press reports say you want to pause after the TTBT and the PNET is ratified to let the new verification procedures. Doesn't this violate the commitment made to Congress? What is the rationale for such a pause, when the CORRTEX techniques agreed to for the TTBT and the PNET can't be used to monitor a CTB (only seismic techniques can be used for this purpose)?

Mr. Tuck. It is not correct that the Administration promised Congress that once the verification protocols were completed we would proceed immediately to negotiate a comprehensive test ban. We did say that, once the verification protocols were negotiated and ratified, we would continue the "step-by-step" process to nuclear testing limitations, leading to the ultimate objective of the complete cessation of nuclear testing as part of an effective disarmament process.

The essentials of U.S. policy as described above remain the same. President Bush's recent policy statement referring to a period of time to implement the protocols simply indicates what kind of internal direction the President has given the U.S. Government in carrying out its commitment to the 1987 statement on "step-by-step."

The rationale for a pause to assess implementation before proceeding is clear: The verification techniques currently being negotiated for the TTBT/PNET protocols are very new and complex. Such extensive on-site monitoring is unprecedented in arms control. It is only prudent that we gain experience with this "first step" before taking the "next step." Since any "next step" may well include CORRTEX as part of its verification requirements, such assessment is quite appropriate.

Statement Of John C. Tuck
Under Secretary
Acting Assistant Secretary For Defense Programs
Department Of Energy
FY 1991 Appropriation Hearings

INTRODUCTION

Mr. Chairman and Members of the Committee, I am John Tuck, Under Secretary of Energy and the Acting Assistant Secretary for Defense Programs. I am serving in this capacity at the request of Secretary Watkins pending Senate confirmation of Victor Stello to the Defense Programs' position. This post has been vacant for over 2 years. It needs to be filled.

I have a detailed statement I would like to submit for the record and summarize it for the Committee this afternoon. I am pleased to appear before you today in support of the Department of Energy's (DOE) FY 1991 Defense Programs appropriation request for $7.5 billion. The request excludes funding for New Production Reactors, Environmental Restoration and Waste Management, Waste Transportation and Site Management, and the Naval Reactor program which are part of the National Security budget function.

Seated next to me at the table this afternoon are the Assistant to the Secretary of Defense for Atomic Energy, Dr. Robert Barker, and the Deputy Assistant Secretary for Military Application, RADM Mike Barr. Also in attendance are the Deputy Assistant Secretary for Nuclear Materials Production, Richard Starostecki; the Acting Deputy Assistant Secretary for Security Affairs, William Barker;

representing the Deputy Assistant Secretary for Intelligence, Robert Walsh, is Eugene Bacher; representing the Director of the Office of Arms Control, Victor Alessi is Anthony Czajkowski; and the Acting Deputy Assistant Secretary for Planning and Resource Management, David Leclaire. Dr. Barker and RADM Barr will provide detailed testimony later this afternoon. Tomorrow morning Richard Starostecki will provide testimony on the Nuclear Materials Production Program; followed by the Director of the Office of New Production Reactors, Dominic Monetta, who will discuss the New Production Reactor Program; and then Representatives from the Defense Nuclear Facilities Safety Board. Mr. Barker, Mr. Walsh, and Dr. Alessi have detailed prepared statements which I would request permission to submit for the record. I will also address their respective program areas in my overview.

I would like to thank the Appropriation Committee for your continued support. Your actions have helped us change the culture at DOE and set a course for the future. I will begin by offering some perspectives on the changing world scene, discuss the Defense Programs mission, address the challenges we are facing, and close with a discussion of Defense Programs budget needs.

THE CHANGING WORLD SCENE

Today, the world order is in a state of flux. Communism appears to be crumbling in Eastern Europe and democracy is on the rise. The Soviet Union, itself, is in the midst of significant political and economic change unthought of only one year ago. While it is premature to predict the outcome, we are hopeful these changes will be successful.

Recent trends in the Soviet Union have been dramatic in scope, and have permeated many facets of our relations with the Soviets. While all would agree that the threat from conventional forces is diminishing, the Soviet Union still has a formidable arsenal of strategic weapons. They continue, for example, to develop and deploy a growing number of new and improved missile delivery systems. Their production of nuclear materials continues unabated with no distinction between military and civilian production sources. To deal with this present imbalance will require that the U.S. maintain a credible nuclear deterrent for the foreseeable future. This lesson has been realized from 45 years of peace through strength, and we must not lose sight of it.

Credible nuclear deterrence, in today's environment, requires us to maintain the capability to respond to a variety of demands while negotiating with the Soviet Union for an orderly reduction in the numbers of strategic systems.

We have learned an important lesson in this country. Unfortunately, the lesson has been learned through years of neglect. For strategic defense to be successful, it must be achieved in a safe and environmentally acceptable manner. It makes little sense for this Nation to field a strong strategic deterrent if we spoil our environment, bring risk to our employees, and potential harm to our neighbors. This Nation cannot afford to meet production requirements at the expense of safety and the environment. There is no other choice; we must learn to achieve both.

While our nuclear weapons must be reliable, safety is absolutely essential. In this regard, DOE is actively pursuing the incorporation of state-of-the-art safety enhancements into new weapons systems. At the same time, we are continuing our nuclear weapons stockpile improvement program to enhance weapon safety for older weapons in the stockpile through retrofits and conversions.

MISSION

The Department of Energy's Defense Programs mission (Chart 1) contributes to national security by supporting the development, production, and maintenance of a credible, safe, and reliable nuclear deterrent. A variety of programs contribute to this mission beginning with the research, development, and testing capability. Defense Programs also oversees the manufacture, maintenance, and retirement of the weapons components and nuclear materials comprising our nuclear stockpile. Significant efforts are directed towards assuring that the Department's nuclear weapons, nuclear materials, facilities, and classified information are protected adequately. In addition, arms control efforts are being directed to assist other agencies in analyzing our adversaries' capabilities and their compliance with treaties.

CHALLENGES

Of late, this Nation's ability to produce nuclear materials in support of our defense responsibilities has been severely limited due almost entirely to environmental, safety, and health concerns associated with operating old facilities. These concerns are the result of a long standing culture which placed the highest priority on production, with a lower priority being given to safe and environmentally sound operations. Management of the defense nuclear complex had not been brought into line with lessons learned in the civilian nuclear power industry subsequent to the Three Mile Island incident. The Department's defense production mission has been operating without a Senate confirmed Assistant Secretary for more than 2 years. Until recently, there were no long-range, comprehensive plans for cleanup of radioactive waste at DOE facilities. Facilities throughout the production complex had been allowed to deteriorate with no firm, integrated, and comprehensive plans for their modernization. Oversight of contractor activities had been inadequate, and in some cases conducted by personnel not possessing the requisite scientific, managerial, and technical skills to oversee these highly complex activities.

No one could review this list of challenges without concluding that there was an urgent need for change at the Department of Energy. On June 27, 1989, Secretary Watkins announced a Ten Point Plan to move the Department aggressively towards full accountability and compliance with environmental, safety, and health laws.

ACTIONS TAKEN TO DATE

We have initiated a major reorganization within Defense Programs to establish clear and direct lines of management responsibility. The Managers of the Savannah River Operations Office and the Rocky Flats Office now report to the Assistant Secretary for Defense Programs. Additionally, the Headquarters Organizations have been realigned to provide added resources, clearer lines of authority, and enhanced capability to oversee field operations.

The recent increase in Federal pay , effective in January 1991, will provide some help in acquiring personnel with the technical skills required to manage the Department's national defense programs. Last year the Department supported Section 3142 of the Senate amendment to H.R. 2461, the FY 1990/1991 Defense Authorization Bill. The object of that provision was to enable scientists and other highly qualified individuals in the national laboratories to serve in critical positions in the Department of Energy without jeopardizing their return to the national laboratory system. While the full Congress did not support that provision, the Department continues to need such measures to recruit and retain appropriate personnel. Favorable action on these provisions likewise will provide the Department with the authorities it desperately needs in order to acquire the special skills and expertise necessary to enable it to resume safe and environmentally sound production activities in the Department's defense complex.

To put teeth into this new environmental, safety, and health emphasis, we restructured the existing system of award fee contracts for the defense production complex. Compliance with environmental, safety, and health laws and concerns now constitutes at least 51 percent of the contractors' semiannual award fee evaluation. This is a major departure from past practices where production took precedence over environmental concerns.

In addition, DOE: (1) established independent "tiger teams" to conduct environmental compliance assessments; (2) provided access to DOE nuclear facilities for State officials monitoring environmental, safety, and health compliance; (3) moved to strengthen technical capabilities of line-management and oversight personnel; (4) mandated compliance with OSHA standards in defense complex modernization plans; (5) improved DOE procedures for compliance with the National Environmental Policy Act; (6) established a new management team within the Department's office of Defense Programs to emphasize safety over production; (7) accelerated the cleanup of DOE facilities; (8) began development of a comprehensive epidemiological data repository containing information on past and present DOE workers that may be used by any qualified researchers; and (9) appointed an independent advisory panel to evaluate changes needed in the Department's epidemiological program.

DEFENSE ACTIVITIES

Effective and responsible management of the Department of Energy's Defense Programs demands that production requirements be placed into proper perspective. We must move aggressively towards full accountability and operating our facilities in compliance with environmental, safety, and health laws. The budget we have proposed reflects these changing priorities.

The Department's FY 1991 Defense Programs $7.5 billion budget request has been structured to: (Chart 2)

- Emphasize bringing our facilities into compliance with all Federal and State agreements and regulatory requirements.
- Continue operational improvements at Savannah River and Rocky Flats.
- Meet weapons production and nuclear material requirements as agreed to with the Department of Defense.
- Maintain an adequate weapons research, development, and testing capability.
- Support the transfer of technology to the private sector where appropriate.

- Improve management of Defense Programs operations through increased Federal staffing.
- Continue efforts to reduce the backlog of security reinvestigations.
- Close out the Special Isotope Separation program.

The $7.5 billion budget request (Chart 3) for the Department's Defense Programs in FY 1991 represents an 11 percent increase over the FY 1990 appropriation of $6.7 billion. Chart 3 compares the FY 1991 funding request to the FY 1990 appropriation for each program.

Consistent with the Department's changing priorities, Chart 4 presents the areas of major funding changes from FY 1990 to FY 1991. The area of largest increase, where a real growth of $338 million is being provided, is the continuation of reactor safety and support facility improvements at the Savannah River Site. The FY 1991 budget request also provides an additional $155 million for operational improvements at Rocky Flats.

Weapons Activities

The Weapons Activities portion of Defense Programs is comprised of the Weapons Research, Development and Testing (RD&T) program, and the Weapons Production and Surveillance program. These programs are responsible for providing and maintaining this Nation with a modern, safe, and credible nuclear deterrent capability. The FY 1991 funding request for the Weapons Activities (Chart 5) totals $4.7 billion, a 9 percent increase over FY 1990.

Weapons Research, Development and Testing

For FY 1991, the overall Weapons Research, Development and Testing (RD&T) budget of $1.9 billion will remain at basically the FY 1990 funding level with no adjustment for inflation. The FY 1991 budget supports a technology transfer initiative ($10 million) to develop cooperative agreements between DOE's laboratories and U.S. industry. In this regard, we have already received over 40 high-quality proposals to carry out these types of arrangements. The FY 1991 budget also provides for a modest nuclear weapons test schedule. Let me emphasize that nuclear testing, within the core program, is necessary to support research to avoid technological surprise, conduct development programs for new weapons in response to changing threats, and to maintain the safety and reliability of our nuclear weapons stockpile. There continues to be a small reduction in our laboratory RD&T employment from 9,422 in FY 1990 down to 9,175 FTE's in FY 1991. These reductions will occur largely through attrition and transfer of staff to other laboratory programs.

The Nuclear Directed Energy Weapons (NDEW) program supports DOE's threat assessment mission and is necessary to avoid technological surprise. The NDEW budget has been scaled back from $214.4 million in FY 1990 to $191.9 million in FY 1991, and will focus on assessing three major concepts: x-ray laser, hypervelocity projectiles, and optical frequency laser concepts. This reduction is necessary in order to support other high-priority activities.

The budget request for the Inertial Fusion (IF) program is below the FY 1990 level of effort. However, the IF program is important and remains an integral part of the Weapons Research, Development and Testing technology base and helps our scientists understand the many phenomena that occur during a thermonuclear explosion. A near-term objective of the program is to explore the feasibility and affordability of a laboratory microfusion facility. This new experimental facility would advance weapons physics simulation and effects capabilities but cannot substitute for underground tests of nuclear weapons.

Weapons Production and Surveillance

The Weapons Production and Surveillance (WP&S) program supports the manufacture, monitoring, maintenance and retirement of all weapons comprising the Nation's nuclear weapons stockpile. This program funds the procurement of non-nuclear materials, the fabrication and assembly of new nuclear weapons and weapons components, and the life-time maintenance and reliability assessment of the existing nuclear weapons stockpile. Other activities include the development and operation of safe-secure systems for transporting nuclear weapons and weapons components; the construction of weapons system production and production support facilities; and environmental, safety, and health, and safeguards and security upgrades. This program is also responsible for plant operations at the seven weapons production plants. These requirements are developed jointly by the Departments of Defense and Energy and are approved by the President in the annual Nuclear Weapons Stockpile Memorandum.

The FY 1991 Weapons Production and Surveillance budget request is \$2.8 billion--an increase of \$382 million over FY 1990. After taking inflation into account, the budget request reflects increases of \$155 million to pay for operational improvements at Rocky Flats, \$19.7 million to enhance our transportation safeguards capability, \$23 million to implement new training regimes--principally at Rocky Flats, and $23 million to partially fund the contract close out with the Monsanto Corporation. The latter was part of the contractor changeover at the Mound Plant that occurred in 1988.

Weapons production includes deliveries of the B61 Tactical Bomb, the W80-0 Sea Launched Cruise Missile Warhead, the W80-1 Air Launched Cruise Missile Warhead, the B83 Strategic Bomb and the W88 Trident II Warhead. Funding is also included to continue the Facilities Capability Assurance Program, an ongoing effort to upgrade aging weapons production facilities.

Nuclear Materials Production

The FY 1991 budget request for Nuclear Materials Production (NMP) (Chart 6) is $2.4 billion, a 15 percent increase over the FY 1990 appropriation of $2.1 billion. The major element driving the funding increase is the ongoing effort to improve our operations at the Savannah River Site, which I previously mentioned.

The NMP reactors are the Nation's only means of producing most nuclear materials to meet defense requirements. The principal materials produced are tritium and plutonium. Enriched uranium is obtained from gaseous diffusion. This program also produces nuclear materials for use in government research and development activities and in civilian research, commercial and medical applications. I cannot overemphasize that the facilities comprising this Nation's ability to produce nuclear materials are very old, fragile, and extremely vulnerable to disruptions.

Most of the facilities in the Defense Programs' complex were built during the 1950's and early 1960's largely as a reaction to World War II and the following Cold War. As a result, the facilities were built to much less stringent environmental and safety regulations. During the 1970's and 1980's, a number of these facilities were permanently shut down after years of neglect. Meanwhile, the commercial nuclear industry was learning much about the potential effects of its operations on workers and the public. They responded by making physical and procedural changes in the way they operated their facilities. DOE now faces similar challenges but, at the same time, must plan and implement the modernization of the complex for the future.

Facilities and Operational Improvements

Currently, the Nuclear Materials Production program is not producing any tritium or plutonium. All reactors are shut down so that improvements can be made to reactor hardware, procedures, training, management systems and practices, and maintenance to assure future safe operation. Many of these improvements are not one-time activities, but rather will require a sustained level of funding for as long as the reactors operate. The need to continue to operate facilities that were designed and built over 35 years ago has led to a backlog of maintenance upgrades and operational improvements that need to be addressed.

The program's first priority is to resume production of tritium as soon as improvements can be made to ensure the continued safe and reliable operation of the reactors at Savannah River. The tentative schedule for resumption of operations calls for the first reactor to become operational in the fall of this year, with the remaining two reactors to resume operations shortly thereafter.

It should be noted that there are still uncertainties connected with this schedule. Secretary Watkins expects to finalize these dates about mid-April of this year, but no final decision will be made until after the environmental impact statement is completed.

The current status of many of the nuclear material processing operations at Savannah River is similar to that of the reactors, before intensive safety enhancement efforts began. Funding priorities in prior years forced the deferral of preventive maintenance, operational improvements, operator training, enhanced technical support, and improved incident analysis systems. DOE cannot, and will not, operate these facilities without the assurance that they can be operated safely and reliably. The Department must begin to correct these deficiencies or face eventual facility shutdown.

On December 21, 1989, the National Research Council of the National Academy of Sciences issued a report entitled, "The Nuclear Weapons Complex, Management for Health, Safety and Environment." The Council's study focused on the 17 major non-reactor installations in the nuclear weapons complex. Their report provided recommendations for many improvements in the areas of management, industrial safety, fire safety, criticality safety, seismic safety, and occupational health. Many of their findings echo the type of improvements currently included in our reactor restart program. The Department is preparing a response to the report and will develop an implementation plan to address these issues. However, the results of the Council's study were not unexpected. In fact, based on experience gained at our reactor facilities, DOE had already taken steps to identify problems at non-reactor facilities. At the Savannah River Site, this resulted in the development of a Non-Reactor Improvements Plan. Although funded at a slower pace than the Reactor Operations Management Plan, the Non-Reactor Improvements Plan and similar efforts at other sites have been incorporated into our FY 1991 budget request.

NMP Initiatives

These initiatives include improvements in procedures and training at the Savannah River Site, with emphasis on the reactor operations area and reactor safety construction activities. Efforts will continue on the complex-wide productivity retention facility enhancements, restoration of the Idaho Fuels Processing Facility to provide increased capacity for the increased recovery of Naval spent fuels, and ongoing capital equipment expenditures for facility and infrastructure improvements.

This budget implements an orderly closeout of the Special Isotope Separation (SIS) program. Based on a careful review of weapons-grade plutonium requirements, we have determined that the production capability that would have been provided by the SIS facility cannot be justified in relation to higher funding priorities. We will, however, complete development activities during FY 1991 in order to preserve a viable option to deploy this technology, should future national security demands dictate.

Security Affairs

The Security Affairs portion of Defense Programs is comprised (Chart 7) of the Verification and Control Technology program, the Nuclear Safeguards and Security program, and the Security Investigations program. The FY 1991 budget request for these programs totals $330 million; a 13 percent increase over the FY 1990 appropriation of $292 million.

Verification and Control Technology

The Verification and Control Technology program supports the development and execution of U.S. national security and foreign policy interests in the areas of treaty verification, intelligence, and arms control. The $174 million request provides an increase of $8.2 million for the FY 1991 effort. We have developed, or are developing, systems to verify compliance with the Limited Test Ban Treaty, Threshold Test Ban Treaty, Peaceful Nuclear Explosions Treaty, and Intermediate Range Nuclear Forces Treaty, as well as a future Strategic Arms Reduction Treaty, Chemical Warfare Treaty, Conventional Forces in Europe Treaty, and the Open Skies initiative.

In addition to longstanding intelligence interests and activities, Secretary Watkins has expanded the role of intelligence to provide foreign intelligence in support of such Departmental and national policies as the development of a comprehensive National Energy Strategy, safe and environmentally sound disposal of radioactive waste, strengthening the domestic energy industry's ability to compete in the international marketplace, and responding to the challenge of potential global climate change.

Nuclear Safeguards and Security

The Nuclear Safeguards and Security program is responsible for developing policy and research and development into measures to assure adequate protection of the Department's nuclear weapons, nuclear materials, facilities and classified information against theft and sabotage, espionage and terrorist activity. Technical support is also provided to international activities designed to minimize the proliferation of nuclear weapons. The FY 1991 request of $91 million will provide a balanced program, with emphasis on strengthening protection against the potential insider threat. This is in keeping with recommendations contained in an interim report prepared by the Secretary's Safeguards and Security Task Force which is reviewing the status of safeguards and security throughout the DOE complex.

Security Investigations

The Security Investigations program funds background investigations for DOE and contractor personnel who require security clearances. Such clearances are required for those individuals requiring access to restricted data, national security information or special nuclear material. Actual investigations are conducted by the Federal Bureau of Investigation and the Office of Personnel Management.

The FY 1991 budget request of $65 million will enable the Department to continue to conduct initial investigations for new employees while reducing significantly the backlog of overdue reinvestigations. Additional security investigation requirements result from increased remedial efforts underway currently at the Savannah River Site and Rocky Flats Plant, as well as implementation of the Personnel Security Assurance Program for those personnel involved with nuclear explosives, components and special weapons assemblies.

FY 1990 Reprogramming Request

A related funding matter I wish to discuss briefly with you today is the need for urgent support of the FY 1990 Defense Programs request recently forwarded to you to reprogram $291 million from within the Atomic Energy Defense Activities appropriation and to transfer $135 million from the Department of Defense to the Department of Energy. Your cooperation is urgently needed to enable the Department to continue efforts to upgrade the Savannah River reactors for restart; and continue the defense production complex on an approach towards achieving compliance with applicable regulations; strengthen security protection; improve and broaden Federal management oversight; and place the N Reactor at Richland, Washington, in a dry standby status.

These actions are essential to our efforts to continue with several of the initiatives underway in the Department. The production of tritium can resume only after the safe restart of the Savannah River reactors. Problems within the production complex must be addressed to improve the quality and safety of operations. Environmental and safety concerns must be resolved to assure the next generation that the Department's facilities are environmentally sound. Your favorable action on this request will allow us to move expeditiously on these important actions.

CLOSING REMARKS

We have worked extremely hard this year to obtain a firm understanding of the magnitude of the problems facing DOE. During this period we have established new goals, initiated a major change in the DOE culture, and developed new budget plans to achieve our objectives. Along the way, I believe we have set in motion those processes necessary to carry the Department to a new, higher level of efficiency and effectiveness. At present, we are by no means out of the tunnel but at least we are beginning to see a distant glimmer of light. I expect the Department's condition to be good by the end of this year, and excellent by the end of 1991.

While we are making progress, we have concerns (Chart 8) and there are risks associated with accomplishing our objectives on schedule. While we believe the Savannah River reactor restart schedule will be achieved, there are concerns associated with the timely resumption of operations at Rocky Flats, and our ability to meet future DOD weapon delivery requirements. Other uncertainties, for which funding has not been included in our FY 1991 budget request, are the unknown requirements which may be identified by our Tiger Team investigations, and verification requirements which are not in place today. We are also concerned about the downward trend we are experiencing in our national laboratories.

I personally want to thank you for your support. It has been a significant factor in helping us change the course at the Department of Energy. As new dimensions take shape--sounder environmental stewardship, safer facility operations, and changing defense requirements--I look forward to working with the Congress to secure the necessary resources and support to carry out effectively and completely the Department's important mission.

At this time I will be pleased to answer any questions you may have.

U.S. Department of Energy
Office of the Secretary
Washington, D.C. 20585
202/586-5534

BIOGRAPHY

JOHN C. TUCK

John Chatfield Tuck was nominated by the President to be the Under Secretary of Energy on April 4, 1989. Mr. Tuck was confirmed by the United States Senate and sworn into office on April 12, 1989.

Prior to joining the Department of Energy, Mr. Tuck served in several capacities at the White House from 1986 to 1989. Most recently he was Assistant to the President and Director of the Office of the Chief of Staff. In earlier positions Mr. Tuck served as Deputy Assistant to the President and Executive Assistant to the Chief of Staff Howard H. Baker, Jr.: Deputy Assistant to the President for Legislative Affairs; and Special Assistant to the President for Legislative Affairs.

From 1981 to 1986, Mr. Tuck served as Assistant Secretary for the Majority in the United States Senate where he assisted Majority Leaders Baker and Dole with the day-to-day Floor operation of the U.S. Senate. He was the Manager of the Minority Floor Information Services, U.S. House of Representatives from 1977 to 1981; and served as Assistant Manager from 1975 to 1976. Mr. Tuck has also assisted the Republican Leadership in the Office of Records and Registration for the Clerk of the House of Representatives from 1974 to 1975.

Mr. Tuck served on active duty in the United States Navy from 1968 to 1973. He served on the USS Bausell from 1968 to 1971. Mr. Tuck was assigned to the Bureau of Navy Personnel from 1971 to 1973. He is currently a Captain in the Naval Reserve.

A native of Dayton, Ohio, Mr. Tuck received his B.S. in international economics from Georgetown University, School of Foreign Service, in 1967.

Mr. Tuck is married to the former Jane McDonough of Garden City, New York, and they have three sons. They currently reside in Arlington, Virginia.

April 1989

DEFENSE PROGRAMS

CHART 1

DEFENSE PROGRAMS MISSION

- SUPPORT NATIONAL SECURITY POLICIES OF THE UNITED STATES FOR A NUCLEAR DETERRENT
  - CONDUCT ALL OPERATIONS IN A SAFE, SECURE AND ENVIRONMENTALLY RESPONSIBLE MANNER
  - CONDUCT RESEARCH AND EXPERIMENTS ON THE MILITARY APPLICATION OF ATOMIC ENERGY
  - PRODUCE AND MAINTAIN NUCLEAR WEAPONS AND NUCLEAR MATERIALS, AND MANAGE GENERATED WASTE
  - ASSESS FOREIGN NUCLEAR WEAPONS CAPABILITIES AND COMPLIANCE WITH TREATIES
  - PROVIDE SAFEGUARDS AND SECURITY FOR NUCLEAR WEAPONS, DEVICES, MATERIALS, FACILITIES, AND INFORMATION

DEFENSE PROGRAMS

CHART 2

FY 1991 DEFENSE PROGRAMS BUDGET

- EMPHASIZES ACTIVITIES TO BRING DP FACILITIES INTO COMPLIANCE WITH APPLICABLE REGULATIONS
- SUPPORTS INTENSIVE EFFORTS TO IMPROVE OPERATIONS AT SAVANNAH RIVER AND ROCKY FLATS
- PROVIDES DELIVERY OF NEW WEAPONS AND STOCKPILE IMPROVEMENTS TO EXISTING WEAPONS TO THE DEPARTMENT OF DEFENSE
- MAINTAINS ADEQUATE RD&T BASE
- SUPPORTS TECHNOLOGY TRANSFER TO PRIVATE SECTOR
- PROVIDES INCREASE FEDERAL STAFFING TO IMPROVE MANAGEMENT OF DP OPERATIONS
- SUPPORTS GOAL FOR ELIMINATING SECURITY INVESTIGATIONS BACKLOG BY 1993
- CLOSES OUT SPECIAL ISOTOPE SEPARATION PROGRAM

DEFENSE PROGRAMS

CHART 3

DEFENSE PROGRAMS
FY 1991 REQUEST
(DOLLARS IN MILLIONS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1991 REQUEST
RESEARCH, DEV. AND TESTING	$1,839	$1,864	$1,885
PRODUCTION AND SURVEILLANCE	2,104	2,375	2,757
PROGRAM DIRECTION	83	99	106
NUCLEAR MATERIALS PRODUCTION	1,943	2,092*	2,413
VERIFICATION AND CONTROL TECH.	155	166	174
SAFEGUARDS AND SECURITY	79	85	91
SECURITY INVESTIGATIONS	43	41	65
SUBTOTAL DEFENSE PROGRAMS	$6,246	$6,722	$7,491
(% CHANGE)			(+11.4%)

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* INCLUDES $135 MILLION FROM DOD

DEFENSE PROGRAMS

CHART 4

DEFENSE PROGRAMS
SUMMARY OF CHANGES FROM FY 1990
(DOLLARS IN MILLIONS)

FY 1990 CONGRESSIONAL APPROPRIATIONS	$6,722
ESCALATION	+ 280
SAVANNAH RIVER OPERATIONS	+ 338
ROCKY FLATS INITIATIVE	+ 155
INCREASED SECURITY INVESTIGATIONS	+ 23
WEAPONS TRANSPORTATION SAFEGUARDS INITIATIVE	+ 20
INCREASED FEDERAL STAFFING	+ 14
MONSANTO PARTIAL CONTRACT SETTLEMENT	+ 23
WEAPONS RD&T	- 63
SIS CLOSEOUT	- 56
BASE PROGRAM (MAINTENANCE/SAFETY & HEALTH/ETC)	+ 35
FY 1991 CONGRESSIONAL REQUEST	$7,491

DEFENSE PROGRAMS

CHART 5

FY 1991 BUDGET REQUEST
WEAPONS ACTIVITIES
(DOLLARS IN MILLIONS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1991 REQUEST
RESEARCH, DEVELOPMENT & TESTING			
CORE PROGRAM	$1,435.6	$1,480.2	$1,525.9
NUCLEAR DIR. ENERGY WEAPONS	240.3	214.4	191.9
INERTIAL FUSION	163.5	169.2	166.8
TOTAL RD&T	$1,839.4	$1,863.8	$1,884.6
PRODUCTION & SURVEILLANCE	$2,103.9	$2,374.5	$2,757.0
PROGRAM DIRECTION	$ 83.2	$ 99.4	$ 106.4
TOTAL WEAPONS	$4,026.5	$4,337.4	$4,748.0
(% CHANGE)			(+9.5%)

DEFENSE PROGRAMS

CHART 6

FY 1991 BUDGET REQUEST
NUCLEAR MATERIALS PRODUCTION
(DOLLARS IN MILLIONS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1991 REQUEST
BASE PROGRAM:			
SAVANNAH RIVER	$1,040	$1,194	$1,578
OTHER	632	613	591
SPECIAL ISOTOPE SEPARATION	102	119	67
NAVAL REACTOR SUPPORT	169	166	177
TOTAL REQUEST	$1,943	$2,092	$2,413
(% CHANGE)			(+15.3%)

DEFENSE PROGRAMS

CHART 7

FY 1991 BUDGET REQUEST
SECURITY AFFAIRS
(DOLLARS IN MILLIONS)

	FY 1989 APPROP.	FY 1990 APPROP.	FY 1991 REQUEST
VERIFICATION AND CONTROL TECH.	$ 155	$ 166	$ 174
SAFEGUARDS AND SECURITY	79	85	91
SECURITY INVESTIGATIONS	43	41	65
TOTAL SECURITY AFFAIRS	$ 277	$ 292	$ 330
(% CHANGE)			(+13.0 %)

DEFENSE PROGRAMS

CHART 8

FY 1990/1991 CONCERNS

- TIMELY RESTART OF SAVANNAH RIVER
- RESUMPTION OF OPERATIONS AT ROCKY FLATS
- ABILITY TO MEET DOD REQUIREMENTS
- NEW REQUIREMENTS FROM TIGER TEAM INVESTIGATIONS
- FUNDING FOR FUTURE VERIFICATION REQUIREMENTS
- DOWNWARD TREND IN RESEARCH, DEVELOPMENT AND TESTING

STATEMENT BY

THE HONORABLE ROBERT B. BARKER

ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY)

BEFORE THE

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON APPROPRIATIONS

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

MARCH 12, 1990

INTRODUCTION (U)

(U) Mr. Chairman, and members of the Committee, I am pleased to once again appear before the Committtee to present the views of the Department of Defense (DoD) in support of the Department of Energy's (DOE's) proposed Atomic Energy Defense Activities Budget. As the Assistant to the Secretary of Defense (Atomic Energy), and Staff Director of the Nuclear Weapons Council (NWC), I can inform you that the Defense Department supports the Atomic Energy Defense Activities Budget that insures that a reliable stockpile is maintained and our Country's strategy of deterrence is upheld.

(U) The nuclear weapons production called for in this FY 1991 budget will allow nuclear weapons with the most modern of safety and security features to replace weapons built in an earlier era, and provide warheads for the Sea Launched Cruise Missile and TRIDENT II missile. The Department of Energy's (DOE) budget also supports the research and development efforts upon which we depend for the nuclear weapons concepts which will maintain a credible nuclear deterrent for the foreseeable future. A robust nuclear test program is critical to this research and development effort. In FY 1991, we look to DOE to support national security requirements by developing: the modern 155mm artillery shell, the W82; the W89 warhead for strategic short-range, attack missile SRAM II; the B90 depth/strike bomb to replace the aging B57 bomb; a warhead for the tactical air-to-surface missile; and a warhead for the missile to replace the existing LANCE missile.

DELETED None of these functions can be carried out without a DOE complex which can operate safely while ensuring that the environment remains healthy. Recent shortcomings in these areas have resulted in plant shutdowns which have, in turn, meant that the DELETED

DELETED . The Rocky Flats situation DELETED of the production which had been expected for FY 1990 and FY 1991. In the aftermath of the Savannah River site shutdown, the United States has met its tritium requirements

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. Full funding of DOE's budget is also needed to restore these facilities to operation, and to keep all other elements of the complex in operation.

(U) New tritium production will be needed as long as we have nuclear weapons. The New Production Reactor program is necessary to insure that we will have an assured, reliable supply for our deterrent in the next century.

(U) In the remainder of my testimony I will address the work of the Nuclear Weapons Council during the last year, amplify on the remarks I have just made, and comment on related activities in support of deployed weapons.

NUCLEAR WEAPONS COUNCIL (U)

(U) The Nuclear Weapons Council (NWC) was established by the 1987 National Defense Authorization Act.

(U) A primary responsibility of the NWC is the annual preparation of the Nuclear Weapons Stockpile Memorandum (NWSM). To accomplish this, the Council reviews the warhead requirements, the inventory of essential nuclear material, and the capability of DOE's infrastructure. I can assure you that those requirements are reviewed very thoroughly at all levels within the DoD and DOE and represent our best judgment that the stockpile is properly sized for the military objectives required to fulfill our national policy of deterrence. When determining our blueprint for building and retiring warheads, the DOE's capabilities are weighed carefully.

Deleted Our philosophical objective is to maintain a minimum stockpile consistent with military requirements. This goal cannot be achieved without a modern nuclear weapons complex that is environmentally safe and in compliance with today's standards. The Council and the Department of Defense strongly support the DOE efforts that permit restart of the Savannah River reactors. Restart must be accomplished

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In addition, resumption of operations at Rocky Flats is critical to meet established stockpile requirements.

Deleted Disruptions in the day-to-day operations of each facility in the production complex cascade downward to affect other elements. Of particular concern, is the interruption of plutonium operations at Rocky Flats. If sustained, it will result in delays to the essential modernization of the stockpile.

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(U) Another important area of the Council's responsibility is the consideration of nuclear weapons systems safety. During the year past, we have established a supporting committee for weapons safety to augment the safety responsibilities of the previously established Standing Committee.

(U) Both the Nuclear Weapons Council Standing Committee (NWCSC), and the Weapons Safety Committee (WSC) support the NWC. These committees include appropriate representation from both DoD and DOE including the Military Services, the Joint Staff, and the various elements of the Department of Energy. Official observers from the Defense Nuclear Agency and key offices with nuclear responsibilities within the Office of the Secretary of Defense are invited to participate in all meetings, deliberations, and activities.

These groups meet monthly to review continuing actions begun under the guidance and direction of the NWC. Annually, the Standing Committee, along with invited congressional committee staff members, visits DOE and DoD facilities to become better acquainted with DOE functional responsibilities, management methods, technology base, and industrial support, as well as DoD operations. The Standing Committee's regular meetings and visits have resulted in improved cooperation and information exchanges. Site visits throughout the complex have focused the Committee's attention on (a) the need for modernization of the complex for reasons of improved safety as well as environmental compliance; (b) reducing transuranic and other hazardous wastes through improved processing; (c) increasing efficiency and production through Total Quality Management practices; and, (d) improving quality and design of production interfaces through computer aided design and manufacturing.

NUCLEAR WEAPONS COMPLEX (U)

(U) The DoD shares with the Secretary of Energy the view that rehabilitating the nuclear weapons complex deserves immediate attention.

(U) The DOE nuclear weapons complex represents a dedicated research and manufacturing infrastructure which supports our nuclear weapons stockpile. Unfortunately, many of the facilities comprising this complex were constructed more than 30 years ago, designed and built to standards and regulations very different and less stringent than those of today. Consequently, across the board production problems due to obsolete technology and more demanding environmental, safety, and health standards and requirements are looming. Despite upgrades and renovations to ensure safer operation, the natural decay of aging has taken its toll. Outages, and shutdowns such as those recently experienced at Savannah River and Rocky Flats, can only increase in frequency in the future unless modernization efforts are properly funded and implemented. The fragility of the aging DOE Nuclear Weapons Complex is threatening our ability to meet defense mission requirements.

(U) Regardless of the course of future world political events, the weapons complex is vital to our Country. In the future the complex must be ready to rebuild weapons to incorporate modern safety and security features or dismantle retired weapons to recover valuable nuclear materials.

Deleted The requirement for an assured supply of tritium to replace that which has decayed in the stockpile continues to focus our attention on the aging Savannah River reactors. Since Spring 1988, when these reactors were shut down,

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and economies in the DOE tritium pipeline have been used to provide the tritium required to make weapons work.

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(U) Given the unknown longevity of the current reactors, national security considerations dictate the immediate implementation of the DOE's three-part strategy identified in the President's budget. Besides the design and construction of two modern production reactors, this strategy also calls for development of light-water reactor targets as a contingency measure for the mid-term. The political and institutional issues associated with the use of light-water reactors for tritium production are formidable. However, these issues must be confronted and weighed against the magnitude of the national security catastrophy that would arise if the Savannah River Site should fail at any time to produce the requisite quantities of tritium before new production reactors are a reality.

(U) Finally, we must not lose sight of the fundamental importance of maintaining a state-of-the-art Department of Energy research, development, and testing capability. As long as the United States relies on nuclear weapons to guarantee its security, a nuclear weapons technology base will be essential to keeping the deterrent credible. Without this base, we can expect neither to respond effectively to the changing global environment, nor to avoid technological surprise.

NUCLEAR WEAPONS STOCKPILE STATUS (U)

(U) In view of the important role played by this Committee in maintaining a safe, secure, reliable, and effective nuclear deterrent, I have made a commitment to inform you once a year on the state of the nuclear stockpile. I have assembled some statistics which will update those furnished to you in my testimony last year.

Deleted On December 31, 1989, the U.S. nuclear warhead inventory consisted of DELETED warheads, a DELETED warheads from the previous year end total.

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Deleted There are 25 different warhead types in today's inventory;

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STOCKPILE MODERNIZATION (U)

(U) In this same timeframe

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. The President's budget for DOE defense program actions balances the need for the renovation of the fragile and aging nuclear production complex with environmental restoration with the competing goal of maintaining a safe, reliable, and effective stockpile.

Deleted As I noted earlier, the disruptions in DOE's production facilities have delayed important modernization objectives.

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This rate of build will not allow us to meet our objectives for the continued improvements needed for strategic modernization and the incorporation of modern safety, security and use control features into the stockpile. The restoration of a healthy DOE production complex will allow the nation to produce at the necessary rate.

(U) The stockpile requirements for the future are under continuous reevaluation. This year, in conjunction with the development of a DoD five-year plan for FY 1992-96, we will once again validate the requirements and evaluate the nuclear weapon requirements of a future world.

STRATEGIC NUCLEAR FORCE MODERNIZATION (U)

(U) The stockpile plan supports the following strategic programs:

- (U) TRIDENT II (D-5 W88. DOE is producing the W88 warhead for deployment of the TRIDENT II (D-5) missile beginning late FY 1990. With the combination of high accuracy and yield, the D-5 will provide our survivable, sea-based strategic force with a greatly improved hard target kill capability. The ninth TRIDENT submarine based at Kings Bay, Georgia, will carry the D-5 missile with W88 warheads. Subsequent new construction TRIDENT SSBNs will be D-5 equipped and be based both in Kings Bay and Bangor, Washington. The orginal eight

TRIDENTs will be backfitted with the D-5 systems during regularly scheduled overhauls.

- Deleted SRAM II/W89. The SRAM II warhead has entered engineering development and will fully support the SRAM II missile delivery schedule.

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The fielding of this system will permit removal of the aging SRAM A warhead. This deployment is crucial to our strategic modernization program.

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NONSTRATEGIC NUCLEAR FORCE MODERNIZATION (U)

(U) Since 1961 the defense strategy of this country has included flexible response. President Bush and Secretary Cheney have recently reiterated their commitment to this policy. Flexible response, as a strategy, requires the United States to maintain a weapons stockpile with a variety of yields and delivery systems so that nuclear deterrence exists at any level of conflict.

LAND-BASED NONSTRATEGIC NUCLEAR FORCES (U)

(U) Two critical requirements are a nuclear tactical air-to-surface missile (TASM) to replace a portion of the nuclear bombs now designed to be carried on U.S. and allied aircraft, and a longer-range, more survivable replacement for the aging nuclear-capable Lance surface-to-surface missile. These systems, coupled with continued modernization of nuclear artillery are a national and identified NATO requirement.

(U) The current DOE budget supports Phase 3 development engineering tasks for a TASM warhead and Phase 2a design and cost studies for a Follow-On To Lance (FOTL) warhead. The DOE FY 1991 budget supports the full-scale development efforts for a common warhead design for the TASM and FOTL. The Nuclear Weapons Council encouraged the common warhead approach for these systems.

Deleted Tactical Air-to-Surface Missile (TASM). SACEUR continues to reaffirm the requirement for a TASM

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A modern warhead for this missile will meet modern safety and security requirements.

Deleted Follow-On to LANCE (FOTL).

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AIR FORCE TACTICAL BOMB MODERNIZATION (U)

(U) DOE is currently producing B61-3, B61-4 and B61-10 bombs, all of which incorporate the most modern safety, security, and use control features.

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ARTILLERY FIRED ATOMIC PROJECTILE (AFAP) (U)

Deleted New AFAPs offer improvements in response time, targeting effectiveness, modern safety features, command and control, and security over their 1956 and 1963 vintage predecessors. The W82 is in DOE Phase 3, engineering development. The W79 8-inch AFAP was first produced in 1981.

DELETED

NAVY ANTISUBMARINE AND LAND ATTACK NUCLEAR WEAPONS (U)

(U) The United States deploys nuclear warheads on a wide variety of ships. Nuclear-capable carrier-based aircraft and nuclear Tomahawk sea-launched cruise missiles have three vital roles: contributing to our nuclear reserve force; providing a worldwide deterrent; and deterring attacks on our naval forces by Soviet nuclear antiship missiles (especially those aboard Backfire and Badger aircraft).

Deleted The B90 nuclear depth/strike bomb, currently in Phase 3 engineering development, will replace the 28 year old B57 nuclear depth/strike bomb. DELETED

DELETED Conventional systems backed up by the ND/SB will provide Navy's antisubmarine capability.

Deleted TLAM/N (W80-0). The Tomahawk Nuclear Land Attack Cruise Missile, or TLAM/N, greatly enhances the Navy's contribution to the U.S. deterrent posture by distributing Navy retaliatory striking power across a large number of naval platforms. DOE is continuing to produce W80-0 warheads for TLAM/N deployments

DELETED

SAFETY, SECURITY AND SURVIVABILITY (U)

(U) As I have previously indicated, the Council and the two Departments consider incorporation of modern safety and security to the stockpile with equivalent concern as improved effectiveness. In fact, we recognize that the incorporation of optimal safety, security and use control features permits improved weapon system effectiveness through enhanced operational flexibility.

Deleted Since 1980, modern nuclear weapon safety features have been incorporated in approximately DELETED of the stockpile. Enhanced security features are included on approximately DELETED Such features include Insensitive High Explosive (IHE), nonviolent disablement, safe and predictable accident response, and modern use control.

Deleted IHE is the most important safety feature of our modernization effort. Its intention is to reduce the risk of scattering plutonium in case of an accident that detonates normal high explosives. Today, about DELETED of the stockpile weapons use IHE. Because of the penalty in weight and size associated with using IHE (it is less energetic than other high explosive materials, therefore, more is needed), not all warheads can be made with IHE. We are working, however, to include IHE in all appropriate warheads in the stockpile and expect to have *DELETED* of the stockpile outfitted with IHE by the year 2000.

(U) All nuclear weapons are protected by physical security and launch protection features. Use control devices prevent the use of that warhead by anyone who would breach the military security system and gain access to the weapon while simultaneously permitting its use when directed by national security. There are several categories of warhead use control: combination locks on older weapons; Category D and F Permissive Action Link (PAL) devices on our newest weapons, as well as some older versions known as Category A and B PALs; and established procedures.

Deleted DOE currently designs warhead electronics such that we can be confident that the probability of a detonation in any plausable accident is less than one chance in a million. Currently, these enhanced safety features have been incorporated in *DELETED* the weapons in the stockpile as a result of modern warhead production and the modification of existing warheads. Over *Deleted* of the stockpile will have such features by the year 2000.

STOCKPILE IMPROVEMENT PROGRAM (U)

(U) The joint DoD/DOE Stockpile Improvement Program (SIP) was initiated formally by the Military Liaison Committee in 1979. Yearly, each weapon is examined to review its operating environment, service recommendations, results of studies, present SIP efforts, and/or planned retirement/replacement programs.

Deleted The 1988 review found that the highest level of safety concern for deployed "older weapons" has been addressed

Deleted

All of these incorporate modern nuclear design safety features. Additionally, the 1989 SIP review endorsed the NDSB/B90, which will replace the *Deleted*

Deleted

NUCLEAR WEAPONS SECURITY (U)

(U) The DoD and the DOE, in close cooperation, carry on a continuous program to upgrade our nuclear weapons security capability.

(U) One of the great challenges of the 1980s has been the ever-changing threat from both terrorists and state sponsored operatives. These groups have demonstrated increasing sophistication in tactics and technology; e.g., the downing of Pan Am Flight 703. A dynamic, evolving security system must always anticipate hostile capabilities and intentions. The terrorist situation presents a special challenge to nuclear weapons security personnel.

(U) Today the physical security of nuclear weapons deployed by the DoD will meet the peacetime threat as we know it. However, the threat continues to evolve and increase. To counter the threat, eliminate the vulnerabilities, and maintain the security of the stockpile, security policy and systems must be developed and fielded quickly and efficiently.

Deleted Following are examples of currently active equipment programs conducted in collaboration with DOE and whose goals are to improve our ability to protect nuclear weapons against the continually evolving threat:

Deleted Weapons Access Delay System (WADS). WADS is a Sandia-inspired system

Deleted

which significantly delays unauthorized access to nuclear weapons in storage.

Deleted

(U) Maintenance and Assembly Security Storage (MASS) and Warhead Protective Casing (WPC). These programs are investigating means to mitigate recognized vulnerabilities associated with nuclear weapons while in storage, during transport and while located in an overseas maintenance and assembly facility.

(U) Mobile Intrusion Detection and Assessment System (MIDAS) is being developed to provide security alarms for the Small ICBM should it be dispersed in the Southwest basing mode.

(U) Tactical Intrusion Detection System (TIDS) is being designed to protect systems deployed in the field against stealthy intruders.

(U) Weapons Storage and Security System (WS3). To improve the security and survivability of air-delivered bombs in an increasingly hostile environment, the Weapons Storage and Security System (WS3), was developed for DoD by

DOE. WS3 provides for the safe and secure collocation of aircraft and weapons in hardened aircraft shelters.

(U) I have provided an extensive description of our nuclear weapons-related physical security activities because DoD depends very heavily upon the DOE's ability to provide extensive technical assistance to the DoD in these areas. I believe we have an active program which is producing sound technical options to meet the evolving threat. This work however, is never complete and needs to receive our continued and collective emphasis and support to see that needed improvements are fielded in a timely manner.

ACCIDENT RESPONSE (U)

(U) The Department of Defense (DOD), in conjunction with the Department of Energy (DOE), maintains a worldwide capability to respond to an accident involving a nuclear weapon. Continuous operation of the National Military Command Center provides the capability for prompt notification of appropriate response organizations and for initial control of response actions. Additionally, the Defense Nuclear Agency maintains a continuously manned Joint Nuclear Accident Coordinating Center, closely tied to a similar DOE center, staffed to assist in coordinating responses for rapid reaction to an accident situation. Throughout the year, all response teams undergo training, and field and command post exercises are held to practice and evaluate the coordinated Federal responses to nuclear weapons accidents.

UNDERGROUND TESTING (U)

(U) For over 40 years, our credible nuclear deterrent forces--requiring a robust arsenal of reliable, safe, survivable, and effective nuclear weapons--have maintained the peace. The DOE nuclear testing program supported by the FY 1991 budget is indispensable to this credible deterrent in several important ways.

(U) First, nuclear testing is vital for establishing and maintaining confidence in the operability and reliability of nuclear weapons. Second, we conduct a nuclear test program to improve the safety, security and effectiveness of our nuclear arsenal. This testing allows us to ensure that the highest possible standards for our warheads are satisfied. Third, the United States tests to ensure we understand the effects of a nuclear environment on military systems. This allows us to have confidence in the survivability of our weapons and our supporting C^3I systems. Finally, by continuing to advance our understanding of nuclear weapons design, nuclear testing serves to avoid technological surprise and to allow us to respond to the evolving threat.

(U) The DoD, based upon the testimony of the national laboratory directors, recognizes our current dependence on continued nuclear testing at the current 150 kt threshold limit. Further nuclear testing limits, including reduction in the number of tests, in the absence of significant changes in our nuclear deterrent requirements, will weaken the ultimate goal of our nuclear arms.

SUMMARY (U)

(U) To review my major points, let me summarize:

(U) Deterrence is, and will remain critical to United States national security. To maintain deterrence, DoD depends upon a strong DOE Defense program activity.

(U) Continued modernization of both our strategic and nonstrategic nuclear forces is essential.

(U) A safe, secure, and effective nuclear deterrent requires a modernized DOE Nuclear Weapons Complex capable of operating safely and with a minimum environmental disturbance.

(U) The Weapons Complex must be again functioning at full capacity in the near future or our defense programs will be compromised.

Statement of RADM J. M. Barr, USN
Deputy Assistant Secretary for Military Application
Department of Energy
FY 1991 Appropriations Hearings

Mr. Chairman, members of the Committee, it is a pleasure to appear before you to testify in support of the Department of Energy's (DOE) Atomic Energy Defense Activities budget request for fiscal year 1991.

1. INTRODUCTION

MISSION OF THE NUCLEAR WEAPONS PROGRAM

The mission of the DOE nuclear weapons program is to support United States national security policy. The keystone of this policy is the nuclear deterrent. In order to assure safe and credible options for nuclear deterrence, we conduct research, development and testing for military applications, and produce, maintain and retire nuclear weapons to support the Nation's stockpile. And finally, we are charged with the responsibility to maintain the United States' nuclear weapons complex operating in a safe, environmentally acceptable manner.

There are three important adjuncts to our mission statement for the 1990's. Secretary Watkins has made these principles the watchwords for his Administration. These are that there must be compatibility between our mission to develop and produce nuclear weapons and protection of the environment; that there be a dedication to excellence in all of our endeavors; and, that we must welcome constructive criticism about all levels of our operations. These principles serve as goals to be attained and benchmarks to measure our progress toward effecting positive cultural change throughout our program operations. I also believe that these principles are the best way to allow DOE to continue to support our nuclear deterrent.

This statement presents four subject areas: resources to accomplish the program goals; major concerns; a report on program accomplishments; and the FY 1991 budget request.

RESOURCES

The nuclear weapons complex represents a unique national investment which has evolved over the past 40 years.

Nuclear weapons program activities are the largest single component of the Department of Energy's budget. This essential national security program represents less than three percent of the Nation's overall spending for defense.

The nuclear weapons complex of today is a balanced combination of highly experienced and qualified scientists, engineers and technicians, coupled with specialized equipment and facilities. This is the DOE technology base which allows us to maintain a research, development and testing capability that is second to none, and to provide state-of-the-art manufacturing capability that meets stringent environmental, safety, health, (ES&H) and security standards.

RESEARCH, DEVELOPMENT AND TESTING

The Weapons Research, Development and Testing program plays an essential role in maintaining the credibility of the U.S. nuclear deterrent. Particularly in this time of rapid change, it is very likely that the RD&T program will be even more important.

Day-to-day technical management of the research, development and testing activities is carried out through the Los Alamos and Lawrence Livermore National Laboratories, which are the nuclear design laboratories; the Sandia National Laboratory, which is the weapons engineering development laboratory, and the Nevada Test Site, where underground nuclear testing is conducted.

Along with unique "birth to death" responsibilities for the weapons in the stockpile, the research, development and testing technology base is vital as the stockpile continues to evolve in response to external forces. As arms control negotiations continue with the possibility of reducing the numbers of nuclear and conventional weapons, it is likely that the force structure will be reconfigured in fundamental ways. Reduced numbers and emerging non-nuclear technologies will place an ever greater premium on survivability of our forces, and it is imperative that we have the highest confidence in those remaining. New system designs will be needed to add flexibility and robust operation to the remaining forces.

The Research, Development, and Testing complex threat assessment capability is an area of increasing importance. It is vital that we not be surprised -- technically -- and that we remain prepared to respond to new threats. We must maintain a vigorous RD&T technology base to assure the nation that we understand fully what is technically possible, and how it could be exploited either by us or against us. Firsthand knowledge is a principal factor in ensuring that no potential adversary could gain an advantage which would reduce the effectiveness of the Nation's nuclear deterrent.

WEAPONS PRODUCTION BASE

The weapons production base is another indispensable resource for the weapons program that must be maintained to fulfill our mission requirements. The Nation's nuclear weapons production complex is comprised of seven government owned, contractor operated production facilities. As with the RD&T technology base, many of the capabilities in these plants cannot be provided anywhere in the private sector. The plants and laboratories are integrated into a nationwide production line, linked together by a computer network that transmits design and engineering information for manufacturing components and piece parts, and a safe, secure transportation system to move components and finished products between sites.

FACILITIES MODERNIZATION

The nuclear weapons complex is a national resource which is troubled by the aging of key facilities. This is one of the root causes of today's problems throughout the complex. As a result, Secretary Watkins has elevated attention to facilities assumptions and conclusions of the modernization study which was performed two years ago.

Representatives from the weapons RD&T and production programs are participating fully in this revalidation of the study. The results are to be reported to Secretary Watkins in August of this year, and will be used in formulating the FY 1992 budget. The modified report, consistent with the budget, should be available in January, 1991. The report will provide a coherent modernization strategy, a workable, fundable program to prevent further deterioration of the complex, and a plan for modernizing the weapons complex to support our nuclear deterrent well into the 21st century.

2. CONCERNS

ROCKY FLATS PLANT

Resumption of operations at the Rocky Flats Plant is the highest weapons program priority. Plutonium operations were suspended for the semi-annual nuclear materials inventory in early December. EG&G took over the responsibility for plant operation on January 1, 1990.

We have extended the suspension of operations to permit EG&G to install their own management team and to gain a comprehensive understanding of plant operations, to implement some operational changes in terms of formality and discipline, and to increase the margin of safety in plutonium operations. The schedule for a phased resumption of full operations is expected to be finalized in April, 1990. Currently, we are planning to resume partial operations during the second quarter of CY 1990, with full operations following in the third quarter. Unfortunately, this will not allow us to achieve all of our production goals for FY 1990.

(CHART 1) Another troublesome aspect of the situation at the site concerns storage and disposition of transuranic waste mixed with hazardous components -- TRU mixed waste. Our permit, granted by the State of Colorado, allows us to store not more than 1,601 cubic yards of this type of waste. Even during standby, waste is being generated, and is being stored on site. The on-site storage limit is projected to be reached about August, 1990. Since no permanent storage facility will be available until the Waste Isolation Pilot Plant comes on line, a supercompactor has been procured to reduce the volume of waste to be stored - and thereby provide temporary relief. I expect the supercompactor to be operational before the storage limit is reached. Supercompacting the waste will provide an additional one to two years before the 1,601 cubic yard limit is again approached.

3. ACCOMPLISHMENTS

WEAPONS SAFETY

During FY 1989, we had several accomplishments in the area of nuclear weapon safety. Last fall, the Departments of Energy and Defense chartered a joint Weapons Safety Committee, under the Nuclear Weapons Council, to serve as a dedicated body for considering nuclear weapons safety issues. The establishment of the committee provides a means for rapid access to both secretaries, when necessary, to inform them of significant safety issues. As the Chairman of this committee, I believe this will enable both Departments to better execute their shared responsibility for nuclear weapon safety.

Other accomplishments include development of a DOE use control policy;

initiation of a joint DOE/DOD weapons transportation study; and the start of a study to determine the feasibility of a risk assessment-based weapons safety evaluation process.

WEAPONS PRODUCTION AND SURVEILLANCE

(CHART 2) In fiscal year 1989, the Department of Energy weapons production complex completed all required production milestones. [DELETED] new or modified warheads were produced and delivered to the Department of Defense for deployment. We continued production on the B61 tactical bomb system, the B83 strategic bomb, the W80-1 Sea and W80-0 Air-Launched Cruise Missile warheads. We initiated production of the W88 Trident II Submarine-Launched Ballistic Missile (SLBM) program.

Three weapons continued in production engineering during fiscal year 1989: the W82 155mm Artillery Fired Atomic Projectile, the B90 Nuclear Depth/Strike Bomb (ND/SB), and the W89 Short-Range Attack Missile (SRAM) II warhead.

The W89/SRAM II and the B90/ND/SB bomb programs will provide significant safety and operational effectiveness enhancements to the Air Force and the Navy, and they will be a significant part of our national security deterrent well into the next century.

In addition to production of new weapons, our continued investment in stockpile reliability and safety is absolutely essential to our mission. During FY 1989, we completed [DELETED]

During FY 1989, we retired [DELETED] warheads from the nuclear weapons stockpile. Other stockpile units required exchange of limited life components. The stockpile evaluation activity includes product acceptance, new material and stockpile laboratory test, and new material and stockpile flight test and surveillance with the B83, W87, W88 and other warheads.

Significant accomplishments in quality and efficiency have been achieved throughout the production complex. Process development activities contribute to all aspects of production operations. As a result of statistical analysis at the Rocky Flats Plant, the B61 Bomb plutonium components rejection rates dropped [DELETED] and resulted in savings of about $180,000 annually.

At the Savannah River Site, development of a new hydride process to separate hydrogen isotopes from impurities is underway with a estimated yearly savings of $450,000. Superplasticly formed uranium-niobium alloy blanks have been produced for the W89 at the Y-12 Plant which reduces production time from 2 hours to 30 minutes. This should save about $200,000 over the life of the program.

Quality initiatives have also contributed to the overall improvement of operations within the production plants. The Mound Plant developed an improved timer disassembly process and removal fixture that permitted reuse of the timer at a fraction of the cost of new built units. A cost savings of $940,000 resulted. This plant also replaced an obsolescent, difficult to repair Atomic Absorption Spectrometer with an Inductively Coupled plasma instrument. The new instrument eliminates the need for extensive decontamination of samples and also minimizes the risk of contaminating a "cold" sample. Over the life of the equipment $1.9 million is expected to be saved.

A Process Certification Program was established at the Pantex Plant to incorporate modern process control techniques for the verification of product quality characteristics and certification of product acceptance. A $455,000 savings has resulted because of the reduced manpower levels required.

At the Rocky Flats Plant a new scheduling philosophy to reduce process times and minimize Work-in-Process (WIP) inventories has been implemented in Building 460. In the past year WIP inventories have been cut about one half; production process time has been reduced even more substantially, from 76 days to 31 days, for an improvement of 59 percent.

PRODUCTION AND SURVEILLANCE CONSTRUCTION

A total of 21 production and surveillance construction projects were completed during FY 1989, with a total estimated cost of over $300 million. These projects included W88 TRIDENT II warhead production facilities at two locations, Consolidated Non-Nuclear Manufacturing Facility at Rocky Flats, High Explosive Subassembly Facility at Pantex, Explosive Component Test Facility at Mound, two ES&H projects, five projects to provide safeguards and security upgrades, and several projects to restore and maintain the utilities and equipment at the production plants.

There were two new project starts, including the Plutonium Recovery Modification Project at Rocky Flats, and five new subproject starts for the Facilities Capability Assurance Program (FCAP).

WEAPONS RESEARCH, DEVELOPMENT, AND TESTING

Accomplishments in weapons research and development are numerous. Noteworthy this year is the development of single chip, radiation hardened 64 bit random access memories by Sandia National Laboratories, which will have wide defense applications. More closely related to the weaponization work was Sandia's completion of a successful ballistic test of an inerted Interim Earth Penetrator Weapon, at the Tonopah Test Range in Nevada. The weapon was operable after a [DELETED] drop onto hard ground. In order to reduce the likelihood of plutonium scattering in an accident, fire resistant pits have been developed [DELETED]

Two unique experimental facilities, the Saturn X-Ray Simulator capable of 20 to 30 trillion watt pulses and Hermes III Gamma Ray Simulator are now operational at Sandia National Laboratories in Albuquerque. Saturn achieved over 500,000 joules of soft x-rays while Hermes III is now capable of firing 3 to 5 shots per day onto targets as large as 25 centimeters. Both facilities are important parts of our weapons effects simulation capability which help determine how our weapons would react in a hostile, anti-weapon environment.

Finally, seven of the "R&D 100" awards -- a worldwide competition to reward innovation sponsored by "R&D Magazine" -- went to DOE weapons laboratories. Scientists at Sandia, Los Alamos and Livermore National Laboratories, and the Y-12 Plant at Oak Ridge received awards. Two examples are the Reflective X-

Ray Mask used to produce high density integrated circuit patterns developed at Lawrence Livermore, and parallel computing software developed at Sandia which will, for certain applications, permit up to a 1,000-fold increase in computing speed compared to present day supercomputers.

WEAPON DEVELOPMENT, ENGINEERING AND CERTIFICATION

In the area of weapon development, engineering and certification, in FY 1989 we worked with the DOD to complete Phase 2 warhead feasibility studies for the Short Range Attack Missile - Tactical (SRAM-T) and the Follow-on To Lance (FOTL) missile systems. Both the Phase 2 and the Phase 2A for the SRAM-T were completed in half of the normal time by use of existing technology and use of modified and existing component designs from the B61-3&4, W85, W88, and W89. The Phase 2 studies for SRAM-T and FOTL resulted in the selection of a common warhead for both weapon systems, with an estimated savings of at least $170 million in production and surveillance costs. Selection of the common warhead will also allow DOE to meet the systems' unusually short lead time to Initial Operational Capability in [DELETED]

Use of technology developed in the technology base is permitting low risk improvements to the SRAM-T/FOTL warhead. Previous investigation of [DELETED] These systems are also benfitting from technology advances in plutonium containment in a fire environment.

TESTING

Underground nuclear testing is an integral part of the overall weapons research and development effort. Understanding the complex processes by which nuclear energy is released in a nuclear explosive is critical to improving nuclear weapon performance. These processes can only be produced in a nuclear test. As a result, nuclear testing represents the highest priority experimental activity in nuclear weapons research and development.

In fiscal year 1989, the Department conducted [DELETED] underground nuclear tests and was heavily involved in fielding another two tests sponsored by the Department of Defense to study nuclear effects. The [DELETED] DOE-sponsored tests included several with multiple experiments and addressed nearly every aspect of DOE's national defense mission. [DELETED] [DELETED]

These underground tests give us data critical to the progress of nearly every aspect of nuclear R&D. They also help assure the continued technical preeminence of our weapon scientists. These scientists make an irreplaceable contribution to our confidence in the nuclear deterrent.

ANNUAL REPORT ON REDUCED RELIANCE ON TESTING PROGRAM

The Department's first annual report to Congress on the Program Status of Preparations for Further Limitations on Nuclear Testing was completed and sent to the Senate and House Armed Services Committees in February, 1990. This was in response to Section 1436 of the National Defense Authorization Act of Fiscal Year 1989 which requested an annual report on the progress made in the program for assuring stockpile reliability, safety, and continued deterrent effect in the event of further testing limitations.

The report reflects the fact that the majority of the elements requested by Section 1436 have been in place and operating as implicit parts of the nuclear weapons program for many years. For example, the weapons program already includes a vigorous stockpile inspection and nonexplosive testing program requiring frequent warhead disassembly and component testing as well as joint DOE/DOD laboratory and flight testing for each weapon in the stockpile. Partially in response to Section 1436, the Department has initiated two new studies: an Above Ground Experimental Capability (AGEX) study and a Remanufacturing/Substitution study. In addition, some of our weapon program activities have been given greater emphasis, such as the area of weapon performance predictive capability.

AGEX STUDY

The AGEX Study will result in a ten to twenty year development plan. The Plan will provide enhanced capabilities for laboratory scale experimentation which simulate phenomena and ranges of performance helpful in developing improved understanding of nuclear weapon design and effects. The first phase of the AGEX Study, which determines the broad requirements for such a technology base, has been completed. The second phase will establish the priorities, and is expected to be completed next year.

REMANUFACTURING/SUBSTITUTION STUDY

The Remanufacturing/Substitution study will determine the feasibility and anticipated problems of remanufacturing weapons or using an existing weapon design to replace a stockpile weapon. This is intended to improve confidence in newly-built weapons in the event of future limitations on nuclear testing. The Remanufacture study should be completed approximately September, 1990.

While we believe there will be some progress in the test limitations readiness program, it is our view that there will be bounds on what can be accomplished. Nuclear testing will be required as long as we rely on a nuclear deterrent.

INERTIAL FUSION

The inertial fusion program is an integral part of the Weapons Research, Development, and Testing technology base. The program's research and experiments contribute to the technology base through increased understanding of the phenomena that occur during a thermonuclear explosion. A major thrust of the program is defining the feasibility and affordability of a laboratory microfusion facility. This new experimental facility would advance diagnostics, instrumentation and calibration, and weapons physics simulation and effects capabilities, but cannot substitute for actual tests of nuclear weapons. Construction could begin in the late 1990's.

NOVA LASER

The NOVA laser at the Lawrence Livermore National Laboratory (LLNL) has had its laser glass replaced with glass that is almost platinum free and has generated a pulse with energy greater than 124 kilojoules, significantly in excess of design specifications. As mentioned earlier, the laboratory also received an "R&D 100" award for development of a reflective x-ray mask for lithography of integrated circuits. This achievement resulted as a spin-off of NOVA program development of x-ray diagnostics development. This device has commercial applications such as the replication of next-generation high density integrated circuit devices. The LLNL successfully initiated their planned [DELETED] experimental campaign by demonstrating the capability of NOVA to generate a variety of coherent laser [DELETED] in a billionth of a second time scale. Such [DELETED] should enable more efficient coupling of energy to ICF targets, thereby reducing the energy required to implode the target to fusion conditions.

PARTICLE BEAM FUSION ACCELERATOR II

The PBFA II accelerator at Sandia National Laboratories has focused an ion beam to greater than 5 terawatts per square centimeter. This exceeds the 1989 goal established by an independent program review committee. Progress is being made on Lithium ion sources, and target implosion experiments should start on PBFA II this year.

AURORA LASER

The AURORA laser at Los Alamos National Laboratory succeeded in fully integrated operations at the 100 terawatt per square centimeter level. Los Alamos is also making progress in their study of the formation of cryogenic fuel layers, a process useful in fabricating advanced ICF targets.

UNIVERSITY OF ROCHESTER

(CHART 3) The University of Rochester/Laboratory for Laser Energetics (UR/LLE) demonstrated a significant improvement in direct-drive neutron yield. Using a beam smoothing technique called "smoothing by spectral dispersion" and improved power balance among the 24 beams of the OMEGA laser, cryogenic implosion experiments showed a 10 fold increase in neutron production compared to 1988 high compression results.

Use at Rochester of a new x-ray framing camera developed by LLNL allowed UR/LLE to make 12 time sequenced images during an implosion that lasted only a nanosecond, the time required for light to travel only a foot. The UR/LLE also was awarded an R&D Magazine award for their development of a liquid-crystal polarizer/isolator used to reduce unwanted depolarization in the OMEGA laser system.

NAVAL RESEARCH LABORATORY

The Naval Research Laboratory has stopped inertial fusion experiments that use the PHAROS glass laser and is developing a KrF laser for short wavelength laser-matter interaction experiments. They are also developing their understanding of plasma instabilities so as to reduce the difference between experimental and theoretical results.

KMS FUSION, INC.

KMS Fusion, Inc. continued to supply some target components and perform other work in target fabrication in support of the overall program.

The Inertial Fusion Division completed a review by an independent group of consultants of inertial fusion target physics results to date. That review confirms the impressive progress made in the last few years and supports the program planning for the next major experimental facility, the Laboratory Microfusion Facility. The Division also issued a new 5-year program plan. An unclassified version of that plan is available. The plan was developed with strong participation of the ICF Program Managers at the laboratories and is the first ICF plan to focus on the Laboratory Microfusion Facility as the next step in the ICF program. The DOE program office conducted a review that validated the proposed OMEGA laser upgrade at the UR/LLE and also completed a preliminary technical design review for that proposed upgrade.

NUCLEAR DIRECTED ENERGY WEAPONS

Nuclear Directed Energy Weapons -- NDEW -- research is being conducted at the national laboratories as an integrated program of theory and experiment to assess the vulnerability of our current nuclear deterrent and future defensive systems to possible adversary nuclear directed energy systems.

[DELETED] [DELETED] In the Hypervelocity Projectiles program at Los Alamos National Laboratory, the major laboratory focus in 1989 has been on above ground testing to understand better the physics of shockless plate acceleration and the critical mechanisms of plate fracture. Numerous above ground tests were performed with the fast shock tube, light gas gun, and particle accelerator examining new projectile designs and operating parameters. [DELETED]

The Optical Laser programs at Los Alamos, Sandia, and Idaho laboratories will continue in FY 1991. [DELETED]

EMERGENCY ACTIONS

Headquarters DOE and the DOE Accident Response Group from the Albuquerque Operations Office participated in two nuclear weapon accident command post exercises in an OCONUS location in February and May 1989. These exercises were sponsored by the Joint Chiefs of Staff. We also participated in a nuclear weapon accident command post exercise at Plattsburg AFB in August that was sponsored by the Strategic Air Command. Headquarters, the Accident Response Group and the Federal Measurement and Assessment Center also provided stand-by support to NASA in the event of an accident involving the Galileo launch.

RESEARCH, DEVELOPMENT, AND TESTING CONSTRUCTION

Five construction projects in the Weapons Research, Development, and Testing program were completed in FY 1989, for a total estimated cost of about $125 million. These included aerial measurements facilities and Pahute Mesa roads at the Nevada Test Site, High Explosive Application Facility at the Lawrence Livermore National Laboratory, and Process Development Laboratory at Sandia. There were no new project starts in 1989.

ENVIRONMENT, SAFETY AND HEALTH

Major environment, safety, and health issues came to the forefront during FY 1989. Significant efforts were undertaken to carry out directives and programs that will implement the Secretary's initiatives to establish a "culture of excellence" within the Department, particularly as it applies to environment, safety, and health.

With this impetus, there are new organizations in place to handle environmental remedial actions, waste management, waste minimization and storage, and decontamination and decommissioning.

We have taken many steps in the Weapons Program to improve our performance in these areas. The contractor award fee criteria has been changed to relate at least 51 percent of the fee to ES&H performance. We are more broadly applying NEPA procedures to the actions we take -- developing environmental assessment and environmental impact statements for major projects such as the SNM Laboratory at Los Alamos. In response to the Secretary's invitation, the Occupational Safety and Health Administration -- OSHA -- participated in three tiger team assessments of nuclear weapons production plants.

TIGER TEAM AUDITS

Seven environmental "Tiger Team" audits have been conducted at weapons program sites -- production plants at Rocky Flats, Kansas City, Mound, Pantex, Pinellas, and Y-12 at Oak Ridge, and the Nevada Test Site. There are two more tiger team assessments scheduled for the first half of FY 1990 for the Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore.

The first seven compliance assessments have highlighted a significant number of environmental, safety, health and managerial findings and concerns. However, the assessments have clearly stated that none of the findings or concerns present an immediate risk to public health or the environment.

We have set up teams to review and evaluate corrective action plans from the seven tiger team audits. The initial analysis has pinpointed some common deficiencies among the sites.

- Some waste handling and storage areas are inadequate
- Labeling and storage of toxics needs improvement
- Some air monitoring procedures and equipment are outdated
- Spill prevention control and countermeasures plans are not always consistent with requirements

OSHA compliance officers identified deficiencies in safety programs for machine guarding, walking and working surfaces, and maintenance of electrical equipment.

As tiger team results come in, they are reviewed and evaluated, and action plans developed to address corrective action responses, schedules, and funding needs. Independent teams will scrutinize these plans, and I will prioritize and implement individual response actions to help us achieve and maintain the Secretary's goals.

These actions, together with the ongoing base program activities in environment, safety, and health are an integral and inseparable part of safe, environmentally-sound operations of all of our facilities.

SAFEGUARDS AND SECURITY

We continued to improve our program for the protection of national security assets by systematically making essential improvements to protect against the outsider and insider threats. Five line item construction projects to upgrade Safeguards and Security at the weapons production plants were completed in FY 1989. The TEC for the projects totalled $43 million at Rocky Flats, Mound, and Pantex.

4. FY 1991 BUDGET REQUEST

(CHART 4) The FY 1991 budget request is over $4.6 billion -- a 9.5 percent increase over 1990. This budget is a product of shifting priorities -- ours in the weapons program, as well as those in the larger arenas of Defense Programs and the Department of Energy. We are emphasizing formality and discipline of operations, continuing to upgrade our performance in environmental, safety and health matters, and improving our commitments to modernization and maintenance of the complex. To do this within fiscal limitations is going to mean less weapons production, less testing, and less research and development. We have formulated our programs for FY 1991 to try and provide a balance among all of these competing demands.

(CHART 5) There is an increase of over 16 percent concentrated in our production and surveillance activities to support initiatives mainly related to safety and improvements in the quality of operations. The increase in research, development, and testing activities is held to only about 1 percent. This has required us to cut back on some of the efforts at our laboratories and the Nevada Test Site.

(CHART 6) The request is also heavily weighted towards concentrating on requirements within the current five year period. This reflects environmental, safety and health activities and urgently required operational improvements at certain facilities while maintaining our commitments to the stockpile.

Less than 20 percent of our FY 1991 request will be invested to meet long term objectives -- FY 1996 and beyond. These activities include advanced concepts research, research on nuclear directed energy weapons and inertial fusion, and construction projects which will not be available for use until after FY 1996. We are working to determine the appropriate balance for the weapons program between investments for the present and for the future. It is a valuable exercise particularly in a time of constrained budgets to assure ourselves that we do not inordinately sacrifice preparation for the future to meet current objectives.

Although we have had to make some hard choices, this budget reflects the most balanced program possible.

I would like to briefly review the individual program budget requests, starting with production and surveillance.

WEAPONS PRODUCTION AND SURVEILLANCE

The Weapons Production and Surveillance budget request supports the fabrication and assembly of nuclear weapons and weapon components, and stockpile maintenance and reliability assessment. The budget request is structured into five major categories for operating expenses: war reserve new production, stockpile maintenance, stockpile evaluation, process development and other costs. Capital equipment funding for basic equipment and computers, and construction funding are separately identified.

WEAPON SYSTEMS WORKLOAD

(CHART 7) The planned total new production and stockpile improvement program output [DELETED] Under current and expected future funding, this is about the maximum we can maintain and still meet obligations in other areas such as environment, safety and health. The Departments of Defense and Energy are working to establish production requirements that are balanced and realistic in terms of current needs and take into consideration competing demands for future DOE funding.

[DELETED]

We would have substituted other builds and maintained our overall numerical production commitment to the DOD, but because of other high priorities, we have redirected DOE weapons production resources. [DELETED]

[DELETED]

The FY 1991 budget request supports production activities for 6 weapon systems, one new stockpile improvement program, and preproduction activities for eight other systems.

(CHART 8) The FY 1991 budget request for Production and Surveillance is $2.757 billion, an increase of $382 million -- 16 percent over FY 1990. Of that amount, $2.3 billion is for operating expenses. Production and Surveillance operating expenses provide for direct costs of producing weapons, as well as for stockpile maintenance and evaluation, and production support costs.

Within operating expenses, after allowing for escalation, direct costs increase by 9.6 percent over FY 1990 levels. Indirect costs increase by 15 percent. This increase is clearly attributable to Rocky Flats Operational Improvements ($87.7 million), Monsanto health benefits payment ($23.0 million), training accreditation ($11.5 million), new safeguards and security requirements ($2.7 million), and expanded health and safety activities ($33.9). These increases are allocated across all of the direct cost categories, and will be discussed in the context of the specific initiatives. Direct cost increases will be discussed in the Budget and Reporting categories that follow.

PRODUCTION AND SURVEILLANCE OPERATING EXPENSES

(CHART 9) War Reserve New Production funding is requested at $1.1 billion, an increase of 10 percent over FY 1990. This funding is allocated to the B61-3, B61-4/10, W80-0, W80-1, W82, B83, W88, W89, B90, Follow on to Lance, and Short Range Attack Missile - Tactical. Overall, the direct portion of these costs is estimated to increase less that inflation. The largest increase in direct costs, about $20 million between FY 1990 and FY 1991, is allocated to the B90, which is scheduled to enter production in [DELETED]

Stockpile Maintenance and Evaluation activities will support 28 systems and over [DELETED] in stockpile. The request for Stockpile Maintenance is $284.5 million, an increase of 15 percent over FY 1990. The B61-9 Stockpile Improvement Program is set to commence in [DELETED] and consequently, direct costs associated with this program increase by about $16 million over the FY 1990 funding level.

Stockpile Evaluation activities are requested at $215.7 million, an increase of 5 percent over FY 1990. This funding provides for evaluation and testing for weapon components, weapons in production, and all systems in stockpile. The direct cost increase requested for FY 1991 is related to preproduction activities for the Follow on to Lance and Short Range Attack Missile - Tactical, as well as for the Stockpile Improvement Programs for the B61-9 and B61-6.

Process Development funding is requested to maintain the necessary technology base at the production plants to support systems in production, as well as to respond to new requirements for materials and processes for future production efforts. The FY 1991 request is $115.9 million, an increase of about 3 percent over FY 1990.

(CHART 10) The largest percentage increase requested in the Production and Surveillance program is for Other Costs. The requested 43 percent increase provides for urgently needed operational improvements at the Rocky Flats Plant, training expenses associated with new DOE Order 5480.18 on Training

Accreditation, funding to continue a FY 1990 initiative to enhance the ground transportation network of safe secure transports, and funding to provide about half of the monies owed to Monsanto Company for closeout of their contract in the area of medical benefits for retirees.

ROCKY FLATS OPERATIONAL IMPROVEMENTS INITIATIVE

(CHART 11) The initiative to permit operational and facility safety and health upgrades to the Rocky Flats Plant is requested at a total of $155 million in FY 1991 -- $113.8 million in operating, $10.0 million in Capital equipment, and $31.2 million in Construction. This is above the base program amount estimated at $521.0 million. Activities will be conducted in four major areas: plant improvements, conduct of operations, environmental, and communications. The draft plan containing schedules and milestones for completion is now in preparation.

The largest component of the request -- $51.8 million -- is for facility upgrades for the site. These include utilities, upgraded sewer treatment, enhanced spill prevention for hazardous liquids, glovebox enhancements, and certain necessary administrative and support facilities to house the augmented work force.

Another $15 million is requested for plutonium residue reduction and recovery, including a drum storage facility.

About $27 million is requested for health and safety of operations. This will provide programs and equipment to enhance dosimetry, decontamination, health physics support, industrial hygiene, and radiation safety, and a facility to house environment, safety and health laboratories.

The remainder of the initiative is made up of literally hundreds of actions --large and small -- to respond to review and audit team findings. We are doing everything from replacing filters and valves to assuring that documentation is properly prepared -- all of it to assure that we operate safely and effectively within the letter and spirit of applicable laws, regulations and agreements.

Closely related to this request is the $23 million initiative requested for training, consistent with the requirements of the new DOE order on training for personnel operating non-reactor nuclear facilities. These funds will be targeted at Rocky Flats for FY 1991.

(CHART 12) Another initiative supports our commitment to enhance nuclear weapon safety. The request contains $19.7 million to expand DOE's safe secure transportation network with 12 additional safe secure trailers, armored tractors, escort vehicles and additional couriers. Currently, some weapons in DOE custody which contain conventional high explosive are shipped by the DOD military airlift command. This initiative will permit ground shipment, within the contiguous United States of all these weapons by 1993. This change will significantly reduce the risk of plutonium dispersal in the event of a transportation accident.

Finally, we have requested $23 million to partially fund a contract closeout liability with the Monsanto Corporation. This will fund health benefits for Monsanto retirees from the Mound, Ohio, plant. The remaining liability will be funded by future appropriations.

(CHART 13) Capital expenditures for Weapons Production and Surveillance are requested to increase by about 13 percent. The Capital Equipment request totals $128.6 million, of which $15.9 is earmarked for major automatic data processing equipment acquisitions, and $9.2 million is planned for three Major Items of Equipment (MIE).

PRODUCTION AND SURVEILLANCE CAPITAL EQUIPMENT

The MIE's include one jet aircraft to replace the King Air Turbo propeller aircraft essential to meeting Albuquerque Operations Office's emergency response missions, with a total estimated cost of $3.5 million; hydrofluorination equipment for Rocky Flats to replace 8 year old systems which are expected to fail before FY 1995 due to the harsh chemical processes involved in aqueous purification and recovery of plutonium, at $4.1 million; and a Computed Tomography System for the Kansas City Plant to provide graphic three dimensional displays for materials cross sections, which is requested at $1.56 million. The requested ADP items are mainly general purpose computers for central computing capabilities at the production plants.

The request for Basic Equipment totals $112.7 million, including funding requested for the MIE's. This is an increase of 15 percent over FY 1990, however, most of the increase is attributable to support for the Rocky Flats operational improvements initiative ($10 million), and the Transportation Safeguards initiative ($2.3 million). This leaves only a 2.6 percent increase to replace and upgrade critical equipment throughout the production complex.

PRODUCTION AND SURVEILLANCE CONSTRUCTION

(CHART 14) The request for Construction totals $328.5 million. Seven new project starts are requested for FY 1991. Two of the projects will provide specialized plant facilities modifications and standard equipment for producing Follow on to Lance and Short Range Attack Missile-Tactical warheads at the weapons plants. One production support project is requested to replace PCB transformers and equipment at the Kansas City Plant. Three new ES&H projects are requested to provide a licensed hazardous waste incinerator and a health calibration facility at the Mound Plant, and to upgrade the Criticality Alarm and Annunciation System at Rocky Flats. Finally, one new safeguards and security project is requested which contains seven subprojects to address insider and outsider threats against SNM at the Mound Plant.

FACILITIES CAPABILITY ASSURANCE PROGRAM

(CHART 15) In addition, there are ten new subproject starts requested under the Facilities Capability Assurance Program -- FCAP -- to continue the systematic replacement of critical areas throughout the production and surveillance complex. Four are utility projects -- electrical and water. Four others are environment and safety related, including a fire station and a ventilation system. The remaining two are programmatic, for high explosives formulation and energetic materials support.

PLUTONIUM RECOVERY MODIFICATION PROJECT

The most important ongoing construction project in the weapons complex is the modification of Building 371 at Rocky Flats. The Plutonium Recovery Modification Project is needed to replace outdated and unreliable facilities--Buildings 771 and 776-- which cannot be upgraded to meet today's environmental and safety criteria. Regardless of whether the DOE ultimately relocates plutonium processing from Rocky Flats, this project is needed for about the next 20 years to provide reliable processing capability using updated chemistry, to reduce waste generation, and to help eliminate backlogged residues now stored in drums.

(CHART 16) We believe that there are no cost effective or technically feasible alternatives to completing this project. Building a new facility at another site would take 8 to 10 years, and cost well over $1 billion. Other DOE plutonium sites, such as Tech Area 55 at Los Alamos, and the new special recovery facility at Savannah River, have capacities less than half of annual requirements, and limited capabilities to process certain feed materials and site returns. Additionally, there would be a significant increase in the risk and cost associated with many more cross country shipments of plutonium and plutonium residues. And there are some residues which cannot be shipped offsite at all. Processing residues at the point of origination, in Building 371, is the most sound, safe, and secure approach.

The project is undergoing peer review to establish a detailed technical baseline. The current TEC has increased to $500-600 million, up from $371 million established in 1987 for inclusion in the FY 1989 budget. About $66 million of the increase is attributable to delays in construction initiation, while $135 million is for additional safety systems, redundant ventilation, and backup power and instrumentation required by recent DOE safety orders. An Environmental Impact Statement is being prepared for the project.

The FY 1991 request is $65 million to continue preliminary design and initiate procurement of key long lead items. The PRMP project is now a solid technical baseline. There is a reasonable near-term cost and schedule, and design is progressing. The EIS process is about to start, and with a positive record of decision, construction will start in 1991. Project completion is schedule for 1997. We are striving to meet the urgent need within DOE for safe, modern, reliable plutonium processing capacity.

WEAPONS RESEARCH, DEVELOPMENT, AND TESTING

(CHART 17) The Weapons Research, Development and Testing (RD&T) program plays an essential role in maintaining the credibility of the U.S. nuclear deterrent. The program develops new weapons and also determines what is possible for the future. The latter area includes threat assessment which will become increasingly important.

In addition to developing new weapons, RD&T responsibilities in maintaining and evaluating the current stockpile include operational reliability, safety, testing, repair, modernization, and dismantling. The RD&T program plays an important role in arms control and verification research. This role may well increase if arms control efforts are successful -- and place additional demands on our resources.

The laboratories are also an important asset in providing the research and development to support our commitment to remediate facilities and to conduct environmentally sound operations.

The FY 1991 request is slightly below the FY 1990 level of effort. We are in transition -- changing the emphasis in weapons development from yield, size and weight towards survivability, safety, security and assured command and control. We are increasing the role of laboratory simulation -- with above ground experimental capabilities, including computers, as we are preparing for a future which may be less reliant on underground testing. We are deemphasizing work on short range and tactical systems in favor of continuing to improve our strategic systems. We are seeking to refine and focus our emphasis on threat assessment throughout the RD&T activities.

RD&T LABORATORY EMPLOYMENT

(CHART 18) Research, development and testing-funded employment at the laboratories is projected to decline about two to three percent from FY 1990 to FY 1991, a reduction of about 250 full time equivalents. The decline in the number of FTE's could be viewed as one indication of the erosion of technical skills which constitute the technology base and nuclear competence of the weapons program. Such skills are not available in the private sector, and when they are lost, they take many years to replace.

The downward trend of FTE's utilized in the weapons RD&T program began in 1985. This is because changes in weapons program priorities have resulted in a shift towards areas such as safeguards and environment, safety, and health.

Our current position is based upon the necessity to balance overall priorities within the budget. For the laboratories, priority has been given to maintaining the stockpile, to threat assessment, and to arms control verification tasks.

TESTING

(CHART 19) [DELETED] underground nuclear tests are planned in FY 1991. We view this level with concern. It is well below the 20 tests per year the weapons laboratories believe are needed to perform their mission responsibilities. It is important to recognize that in a testing program this small, we have little or no flexibility to respond to technical problems or major design changes. [DELETED]

RESEARCH, DEVELOPMENT AND TESTING BUDGET

(CHART 20) The FY 1991 request for Research, Development and Testing activities is $1.885 billion, an increase of 1 percent over FY 1990. The Core program is maintained at $1.5 billion, a 3 percent increase over FY 1990. However, the Nuclear Directed Energy Weapon research and Inertial Fusion efforts are requested at levels below that required to sustain the FY 1990 level of effort. This reflects shifting priorities in the weapons program, and the necessity to allocate scarce funding resources to other high priority activities.

CORE PROGRAM

(CHART 21) The Research, Development and Testing Core program provides funding to support the Technology Base, Weapons Development Engineering and Certification, Testing Capabilities and Special Projects, including emergency response capabilities and activities in support of the Marshall Islands.

Technology Base funding is requested at $505 million. This will continue activities primarily at the weapons laboratories in the critical sciences and technologies, and operate facilities needed for the program. [DELETED] Weapons Development Engineering and Certification activities support weaponization, Phases 1 through 4, as well as stockpile surveillance and maintenance activities. The request for FY 1991 is $468 million, an increase of 4.5 percent over FY 1990. The request will provide for Phase 3 development activities on the W89 SRAM II, B90 ND/SB, FOTL and SRAM-T, as well as Phase 1,2 and 2a studies. [DELETED]

Testing Capabilities funding is requested at $187 million to support test diagnostics, containment, and weapons phenomenology, as well as maintenance of the Nevada Test Site. This request is consistent with planned test levels for FY 1991.

About $90 million is requested for Special Projects in FY 1991. These projects include ongoing Nuclear Emergency Search Team -- NEST -- activities and other emergency response capabilities; funding for research on SNM detection and environmental issues; and support for the Historically Black Colleges and Universities research program. The majority of the increase requested for FY 1991 --$10 million -- is to continue an aggressive Technology Transfer program at the weapons laboratories which was previously funded in the Nuclear Safeguards and Security program. Marshall Islands support, contained in the Testing program budget, is requested at about $5 million for FY 1991. This is to continue RMI personnel studies and medical follow-up, as well as environmental surveillance of the area. The remainder of the recurring activities in the account would be maintained at about the FY 1990 level of effort.

NUCLEAR DIRECTED ENERGY WEAPONS

(CHART 22) The request for nuclear directed energy weapon research is $191.9 million, a decrease of $22.5 million or 10 percent below FY 1990 levels. This represents a significant scaling back of the program from FY 1989 levels - due in part to reduced FY 1990 appropriations, changes in the construction program, and shifts in priorities. However, the program remains a vital element in DOE's ability to perform weapons threat assessment.

Investigations will continue on three major concepts - x-ray laser, hypervelocity projectiles, and optical frequency lasers, as well as studies on vulnerability, lethality and countermeasures and systems.

The program will concentrate on completing ongoing research and data analysis from 1989 and 1990 tests. New research and development, as well as underground testing plans, have been scaled back consistent with overall priorities.

The x-ray laser program is continuing materials and component research, with the early objective of being able to develop a complete laser array of elements that would match predicted output. The Hypervelocity Projectiles program conducted by Los Alamos and Sandia is strongly pursuing conventional high explosive simulation techniques and other laboratory simulation devices to research plate drive for hypervelocity weapon development. [DELETED]

INERTIAL FUSION

(CHART 23) The FY 1991 budget request for Inertial Fusion activities is $157.9 million in operating expenses and $8.9 million in capital equipment. The budget level has been reduced below FY 1990 because of changes in program priorities. Program activities will continue at a reduced level of effort from FY 1990. The NOVA experimental program at Lawrence Livermore laboratory will continue. Developmental work on the Krypton Fluoride laser at Los Alamos Laboratory will also continue. Target experiments with the PBFA-II accelerator will be conducted. Continued target fabrication, development and delivery will be supported by the program's support contractor. Funds are provided to continue support at the University of Rochester and the Naval Research Laboratory. The requested budget level does not support the University of Rochester proposal for upgrade of the OMEGA laser in FY 1991, again because of program priorities. The Congress, in FY 1989 legislation, directed an independent review of the Inertial Fusion program. The National Academy of Sciences conducted the review, and submitted an interim report to the Congress in January, 1990, which was supportive of the program and made technical recommendations about the pace and or continuation of selected research and development efforts contributing to the decision to build a laboratory microfusion facility.

RESEARCH, DEVELOPMENT AND TESTING CAPITAL EQUIPMENT

(CHART 24) Capital Equipment funding supports basic equipment replacement and upgrade at the laboratories and the Nevada Test Site, as well as major items of automatic data processing equipment for the laboratories and two major items of equipment (MIE). The MIE's include $3.5 million requested for a Global Positioning Satellite Translation Ground Station to receive signals from test vehicles to determine time and space position, at Sandia Laboratory; and $3.3 million requested for a Radio Communications System at Los Alamos to enhance two way radio communications during emergencies. Nine major computers are included in the request of $29.1 million for ADP, including final payments on two supercomputers, storage devices and network equipment.

RESEARCH, DEVELOPMENT AND TESTING CONSTRUCTION

(CHART 25) The Construction request for RD&T is $150 million. There are six new project starts requested in the Research, Development and Testing programs --- all contained in the facilities revitalization line item.

(CHART 26) Three projects are Utilities/Infrastructure Support Facilities at the labs and Nevada Test Site; electrical power system upgrades at Lawrence Livermore; replacement and realignment of the main electrical service and switchgear at Sandia Livermore; and upgrading of power distribution systems at the Nevada Test Site. Three others are programmatic projects. The weapons subsystem laboratory at Los Alamos will consolidate SNM activities from aging and dispersed facilities. The Reactor Technology Center at Sandia Albuquerque will provide a gamma irradiation facility, light laboratories and offices. The Crane and Drill Rig Certification Building at the Nevada Test Site will provide needed facilities for servicing heavy equipment now performed outside.

SPECIAL NUCLEAR MATERIALS LABORATORY

(CHART 27) The largest ongoing project in the RD&T program is for the SNM laboratory at Los Alamos National Laboratory. The project is to replace the aging chemistry and metallurgy research --CMR-- building, which is over 35 years old. The project also includes the decontamination and partial refurbishment of the old CMR building.

The project is needed to ensure long term, reliable safe and secure operations for research and characterization of plutonium processing. The new laboratory is the final step in integrating, at Technical Area 55, all plutonium operations at the laboratory. We believe that the new superior research capability for weapons development and for prototype processing systems will better utilize the limited and high cost plutonium resources.

The project has recently been rescoped and revalidated to integrate laboratory plutonium R&D operations at Technical Area 55 and to provide supporting infrastructure, including a waste pretreatment facility and enhanced security. The new cost estimate for the project is expected to range from $370-410 million.

The project was begun in 1988. The FY 1991 request is $20.6 million. Currently, the DOE is preparing an environmental impact statement which is expected to be completed in Spring, 1991. The requested funding will support the EIS, and engineering and project management and support. To compete the project, we must develop a funding strategy within expected budgetary restrictions.

ENVIRONMENT, SAFETY AND HEALTH CONSTRUCTION

(CHART 28) There are seven line item projects in the Production and Surveillance program in this category for FY 1991. The requested funding is $21.4 million. There are no projects in this category in the RD&T programs.

Three new starts are requested for FY 1991. Project 91-D-125, ES&H Enhancements at Mound, will provide a hazardous waste incinerator and environmental buffer zone; Project 91-D-126, Health Physics Calibration Facility at Mound, will provide for repair and calibration of health physics and dosimetry equipment; and, Project 91-D-127, Criticality Alarm and Production Annunciation Utility Replacement at Rocky Flats is a safety project. Continuing projects include 4 subprojects under the 90-D-126 line item for ES&H enhancements to provide operational improvements at the Rocky Flats Plant.

SAFEGUARDS AND SECURITY CONSTRUCTION

(CHART 29) As result of the initiative to improve our overall protection posture against threat of theft by outsiders, our facilities have gone through a comprehensive program of significant physical security upgrades in the recent past. The FY 1991 budget request for Safeguards and Security construction continues with that program.

The FY 1991 request of $24.5 million supports ongoing construction projects: at Los Alamos National Laboratory, Project 88-D-104, Safeguards and Security Upgrade, Phase II; at Lawrence Livermore National Laboratory, Project 87-D-104, Safeguards and Security Enhancement II; Project 88-D-123, Security Enhancements at the Pantex Plant; and Project 85-D-105, Combined Device Assembly Facility at the Nevada Test Site. A new start, Project 91-D-124, provides upgrades at the Mound facility to address insider and outsider threats against SNM and production facilities.

PROGRAM DIRECTION

Program Direction funding contained in the weapons programs account provides funds for personnel and contractual services-related expenses for the Office of the Assistant Secretary for Defense Programs, Deputy Assistant Secretary for Planning and Resource Management, Deputy Assistant Secretary for Military Application, Albuquerque and Nevada Operations Offices, and the Offices of Security Evaluation and Emergency Operations. The Community Assistance Program at Los Alamos, New Mexico, as required by P.L. 94-187, is also provided by this account.

The FY 1991 budget request is $106.4 million, 7 percent above the FY 1990 level. This will support 10 additional FTE's and additional contractual support for oversight related to environmental, safety and health matters.

SUMMARY

In closing, I want to assure you that we are committed to maintaining the nuclear deterrent -- a keystone of our national security. We are also committed to safe and secure operations -- safe for our employees and for the public. And finally, we are committed to maintaining a viable nuclear weapons complex -- to assure that we meet our nation's needs today, and modernize to meet tomorrow's needs as well. I thank you for your support in the past, and seek your support for the funding request presented to you today.

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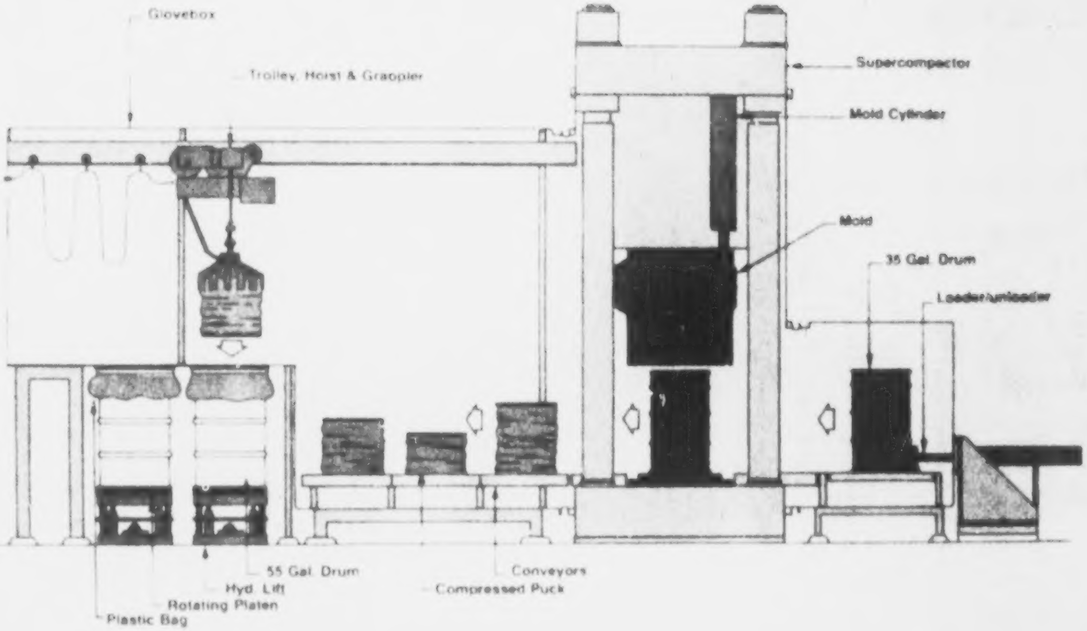
CHART 1


Glovebox
Trolley, Hoist & Grappler
Supercompactor
Mold Cylinder
Mold
35 Gal. Drum
Loader/unloader
55 Gal. Drum
Hyd. Lift
Rotating Platen
Plastic Bag
Conveyors
Compressed Puck

Zeren 4/89

Supercompactor and Repackaging Facility

Loadout Elevation

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UNCLASSIFIED

CHART 2

D-5 Trident II

UNCLASSIFIED

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CHART 3

Multiframe Ultra-High-Speed X-Ray-Framing Images of High-Convergence, Direct-Drive Implosion Demonstrate Improved OMEGA Irradiation Uniformity

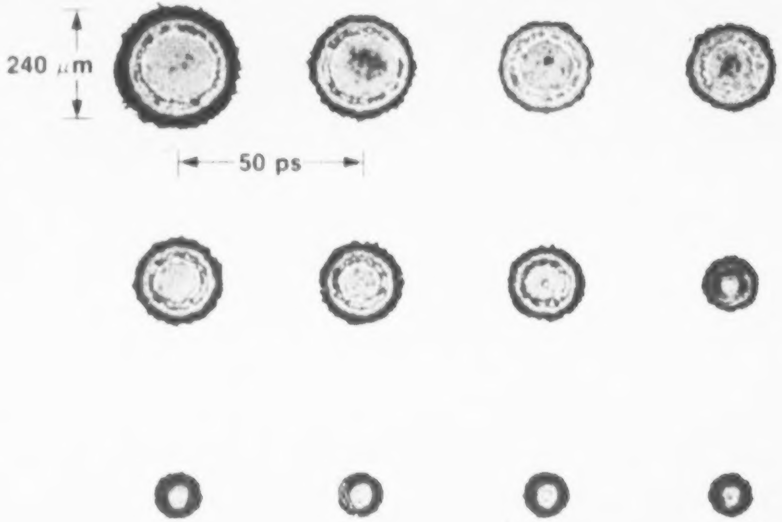

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CHART 4

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

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TOTAL FUNDING REQUEST
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
RESEARCH, DEVELOPMENT, AND TESTING	$1,839.4	$1,863.8	$1,884.6
PRODUCTION AND SURVEILLANCE	2,103.9	2,374.5	2,757.0
PROGRAM DIRECTION	83.2	99.4	106.4
TOTAL WEAPONS	$4,026.5	$4,337.7	$4,748.0

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CHART 5

BUDGET HISTORY

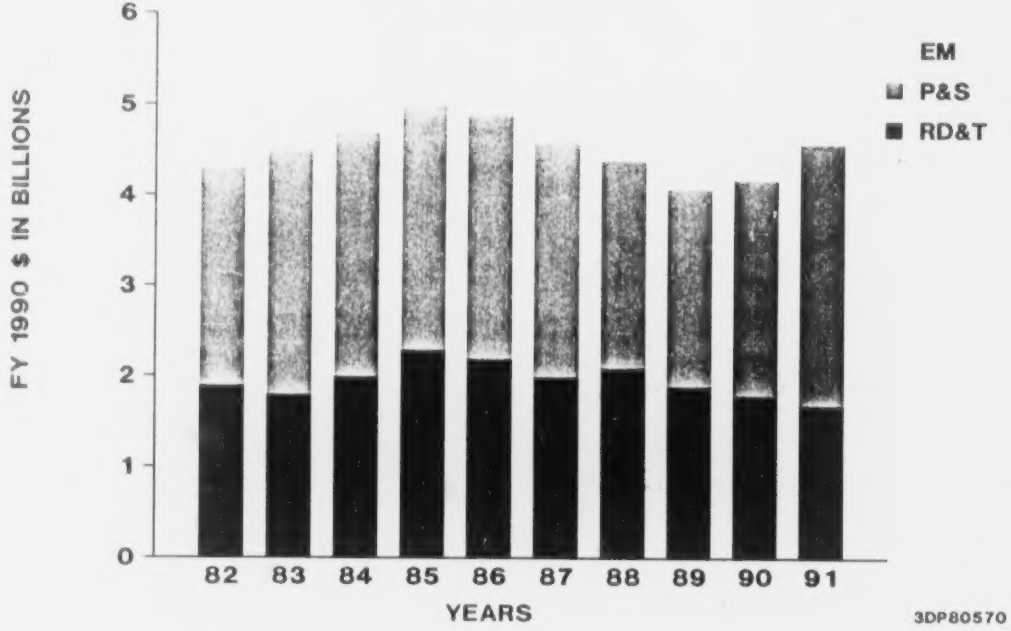

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CHART 6

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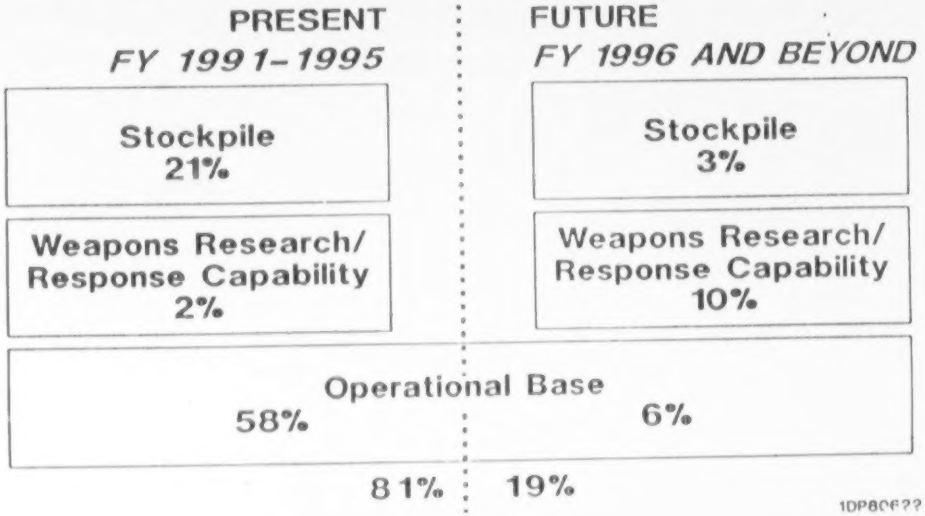
DEFENSE PROGRAMS - WEAPONS ACTIVITIES

PROGRAM BALANCE BETWEEN PRESENT AND FUTURE AND AMONG PROGRAM ELEMENTS:



PRESENT
FY 1991-1995

Stockpile
21%

Weapons Research/
Response Capability
2%

FUTURE
FY 1996 AND BEYOND

Stockpile
3%

Weapons Research/
Response Capability
10%

Operational Base
58%
6%

81%
19%

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CHART 7

CHART DELETED

CHART 8

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

PRODUCTION AND SURVEILLANCE
TOTAL FUNDING
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
OPERATING EXPENSES	$1,793.7	$1,968.2	$2,299.9
CAPITAL EQUIPMENT	103.8	113.4	128.6
CONSTRUCTION	206.4	292.9	328.5
TOTAL P&S	$2,103.9	$2,374.5	$2,757.0

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CHART 9

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

PRODUCTION AND SURVEILLANCE
TOTAL OPERATING EXPENSES
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
WAR RESERVE			
NEW PRODUCTION	$ 918.1	$ 996.0	$1,100.3
STOCKPILE MAINTENANCE	220.7	247.0	284.5
STOCKPILE RELIABILITY	189.4	205.1	215.7
PROCESS DEVELOPMENT	100.8	112.6	115.9
OTHER COSTS	364.8	407.5	583.5
SUBTOTAL P&S OE	$1,793.8	$1,968.2	$2,299.9

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CHART 10

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

PRODUCTION AND SURVEILLANCE
OTHER COSTS
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
NUCLEAR MATERIAL RECYCLE AND RECOVERY	$ 232.0	$ 267.2	$ 380.1
FIELD ENGINEERING AND TRAINING ACTIVITIES	5.2	5.1	5.5
SECURE TRANSPORTATION	57.3	62.9	87.0
FACILITY STARTUP/STANDBY	15.7	11.2	19.1
MISCELLANEOUS	54.6	61.1	91.7
TOTAL OTHER COSTS	$ 364.8	$ 407.5	$ 583.4

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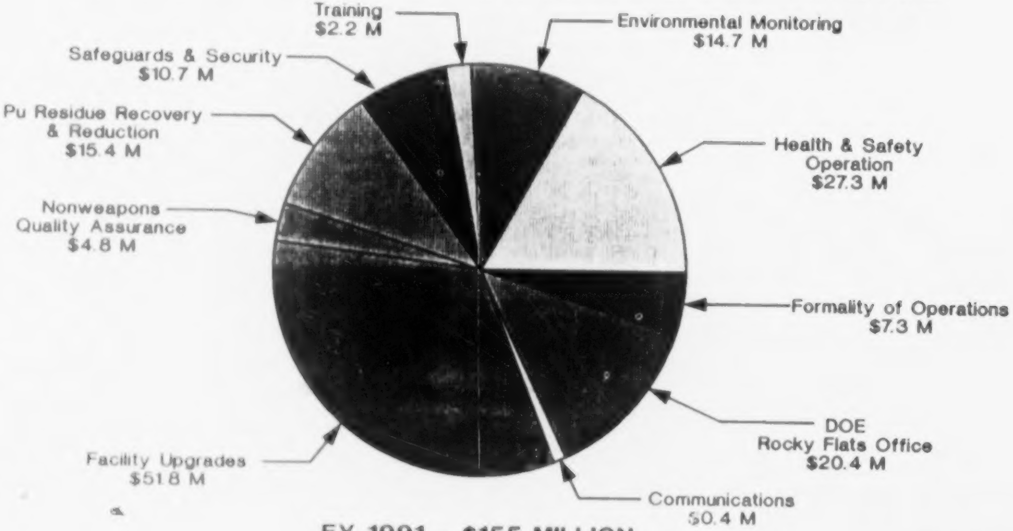
CHART 11

UNCLASSIFIED

DEFENSE PROGRAMS - WEAPONS ACTIVITIES

ROCKY FLATS OPERATIONAL IMPROVEMENTS



FY 1991 - $155 MILLION

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CHART 12

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

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TRANSPORTATION SAFEGUARDS

o REQUIREMENT: ELIMINATE AIR SHIPMENTS OF WEAPONS WITH CONVENTIONAL HIGH EXPLOSIVE

o EXPANSION OF GROUND TRANSPORTATION FLEET REQUIRED:

- 12 SAFE SECURE TRAILERS AND CONVERSION COSTS
- 15 CONVENTIONAL TRACTORS AND CONVERSION COSTS
- COMMUNICATION EQUIPMENT
- COMPUTER EQUIPMENT AND SUPPORTING SOFTWARE

UNCLASSIFIED

CHART 13

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

WEAPONS PRODUCTION AND SURVEILLANCE
CAPITAL EQUIPMENT SUMMARY

($ IN MILLIONS)

	1989	1990	FY 1991 REQUEST
BASIC EQUIPMENT	$ 78.4	$ 84.9	$103.5
MAJOR ITEMS OF EQUIPMENT	10.4	13.0	9.2
COMPUTERS	15.0	15.5	15.9
TOTAL	$103.8	$113.4	$128.6

UNCLASSIFIED

CHART 14

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

PRODUCTION AND SURVEILLANCE CONSTRUCTION SUMMARY
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
PROGRAMMATIC CONSTRUCTION			
WEAPONS SYSTEMS	$ 26.0	$ 48.5	$ 40.8
FAC. CAPAB. ASSUR. PROGRAM	79.3	81.9	131.8
PRODUCTION SUPPORT FAC.	50.1	105.2	78.8
GENERAL PLANT PROJECTS	26.7	24.3	36.4
TOTAL PROGRAMMATIC CONSTR.	182.1	259.9	287.8
ENVIRONMENT, SAFETY AND HEALTH	14.0	27.6	21.4
SAFEGUARDS AND SECURITY	10.3	5.4	19.3
TOTAL P&S CONSTRUCTION	$ 206.4	$ 292.9	$ 328.5

UNCLASSIFIED

CHART 15

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

FACILITIES CAPABILITY ASSURANCE PROGRAM FY 1991 SUBPROJECTS
($ IN MILLIONS)

	TEC	FY 1991 REQUEST	FUTURE YEARS
REPL. ELECTRICAL SYSTEM COMPONENTS, KC	$ 12.7	$ 5.4	$ 7.3
H.E. FORMULATION FACILITY, PX	36.8	2.3	34.5
RENOV. WATER SUPPLY SYSTEM, PX	9.5	0.7	8.8
CENTRAL STEAM PLANT RENOV., RF	3.3	1.0	2.3
REPL. GRAPHITE DUST COLLECTION SYSTEM, Y-12	5.3	1.0	4.3
REFURB. POWER SUPPLY/DISTRIBUTION SYSTEM, Y-12	39.0	1.9	37.1
SITE ELECTRICAL REPLACEMENT, MD	5.0	1.0	4.0
REPL. TEMPERATURE/HUMIDITY COND. SYSTEM, KC	26.3	2.3	24.0
CENTRAL FIRE STATION REPLACEMENT, PX	6.7	0.7	6.0
ENERGETIC MATERIALS PROC/SUPPORT FAC., MD	19.9	4.0	15.9
TOTAL	$164.5	$ 20.3	$144.2

UNCLASSIFIED

CHART 16

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

WEAPONS PRODUCTION AND SURVEILLANCE
($ IN MILLIONS)

PROJECT #	TITLE	TEC	PRIOR YEARS	FY 1991 REQUEST	FUTURE BA
89-D-125	PLUTONIUM RECOVERY MODIFICATION PROJECT, ROCKY FLATS PLANT	$500-600	$48.3	$65.0	$400-500

DESCRIPTION

- RENOVATE BUILDING 371 TO REPLACE OLD, AGING, INCREASINGLY FRAGILE PLUTONIUM FACILITIES IN BUILDINGS 371 AND 776

JUSTIFICATION

- EXISTING BUILDINGS WILL BE WELL OVER 40 YEARS OLD WHEN PROJECT IS COMPLETE AND WILL HAVE SERVED THEIR USEFUL LIFE
- EXISTING BUILDINGS CANNOT BE FULLY UPGRADED TO MEET PRESENT SAFETY, HEALTH, SAFEGUARDS AND SECURITY STANDARDS

STATUS

- THE TEC CONTINUES TO BE REVIEWED. A MORE REFINED ESTIMATE IS EXPECTED MARCH-APRIL 1990 AFTER ADDITIONAL STUDIES HAVE BEEN COMPLETED. THE EIS PROCESS HAS STARTED

UNCLASSIFIED

CHART 17

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

RESEARCH, DEVELOPMENT AND TESTING
TOTAL FUNDING
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
OPERATING EXPENSES	$1,530.3	$1,530.9	$1,589.5
CAPITAL EQUIPMENT	146.3	152.2	145.0
CONSTRUCTION	162.8	180.7	150.1
TOTAL RD&T	$1,839.4	$1,863.8	$1,884.6

UNCLASSIFIED

CHART 18

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

RD&T LABORATORY MANPOWER
FTE'S

	1989	1990	1991
LLNL	3,742	3,516	3,392
LANL	2,645	2,512	2,447
SNL	3,606	3,394	3,336
TOTAL	9,993	9,422	9,175

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CHART 19

CHART DELETED

CHART 20

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

RESEARCH, DEVELOPMENT AND TESTING TOTAL FUNDING ($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
CORE PROGRAM	$1,435.6	$1,480.2	$1,525.9
NUCLEAR DIRECTED ENERGY WEAPONS	240.3	214.4	191.9
INERTIAL FUSION	163.5	169.2	166.8
TOTAL RD&T	$1,839.4	$1,863.8	$1,884.6

UNCLASSIFIED

CHART 21

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

RESEARCH, DEVELOPMENT & TESTING - CORE
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
TECHNOLOGY BASE	$ 475.1	$ 475.2	$ 505.4
WEAPONS DEV., ENG. & CERTIFICATION	441.5	448.0	468.5
TEST CAPABILITIES	175.3	182.7	187.0
SPECIAL PROJECTS	69.7	77.2	90.0
MARSHALL ISLANDS	4.9	5.3	5.0
TOTAL	1,166.5	1,188.4	1,255.9
CAPITAL EQUIPMENT	121.6	129.8	124.9
CONSTRUCTION	147.5	162.0	145.1
TOTAL	$1,435.6	$1,480.2	$1,525.9

UNCLASSIFIED

CHART 22

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

RESEARCH, DEVELOPMENT AND TESTING
NDEW - SUMMARY
($ in MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
OPERATING			
X-RAY LASER	$	DELETED	
HYPERVEL. PELLETS			
OP FREQ LASERS			
VULNERABILITY			
LETH AND COUNTER	6.5	5.1	2.7
SYSTEMS ANALYSIS	5.4	3.4	2.1
SUBTOTAL	$ 208.3	$ 181.9	$ 175.7
CAPITAL EQUIPMENT	16.8	13.8	11.2
CONSTRUCTION	15.2	18.7	5.0
TOTAL	$ 240.3	$ 214.4	$ 191.9

CHART 23

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

RESEARCH, DEVELOPMENT AND TESTING
INERTIAL FUSION
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
OPERATING EXPENSES			
GLASS	$ 94.0	$ 95.5	$ 90.1
GAS	34.1	35.8	36.7
PULSED POWER	25.8	27.4	29.3
SUPPORTING ACTIVITIES	1.6	1.9	1.8
SUBTOTAL OE	155.5	160.6	157.9
CAPITAL EQUIPMENT	7.9	8.6	8.9
SUBTOTAL IF	$163.5	$169.2	$166.8

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CHART 24

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

WEAPONS RESEARCH, DEVELOPMENT, AND TESTING
CAPITAL EQUIPMENT SUMMARY

($ IN MILLIONS)

RESEARCH AND DEVELOPMENT	FY 1989	FY 1990	FY 1991 REQUEST
CORE PROGRAM			
BASIC EQUIPMENT	$ 56.4	$ 71.3	$ 55.4
MAJOR ITEMS OF EQUIPMENT	0	0	6.8
ADP	28.4	19.2	29.1
TOTAL CORE PROGRAM	84.8	90.5	91.3
NDEW	7.7	5.9	7.3
IF	7.9	8.6	8.9
TOTAL R&D	$100.4	$105.0	$107.5
TESTING			
CORE PROGRAM	$ 36.7	$ 39.3	$ 33.6
NDEW	9.2	7.9	3.9
TOTAL TESTING	45.9	47.2	37.5
TOTAL RD&T CAPITAL EQUIPMENT	$146.3	$152.2	$145.0

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CHART 25

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

RESEARCH, DEVELOPMENT AND TESTING
CONSTRUCTION SUMMARY
($ IN MILLIONS)

	FY 1989	FY 1990	FY 1991 REQUEST
Programmatic Construction			
Revitalization	$ 79.2	$ 94.0	$ 97.2
Other Programmatic			
Core Program	47.0	69.5	47.7
Nuclear Directed Energy Weapons	3.2	0	0
Subtotal, Other Programmatic	50.2	69.5	47.7
Total, Programmatic Construction	129.4	163.5	144.9
Environment, Safety and Health	5.4	0	0
Safeguards and Security	28.0	17.2	5.2
Total, RD&T Construction	$162.8	$180.7	$150.1

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CHART 26

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

RESEARCH, DEVELOPMENT AND TESTING
CONSTRUCTION NEW STARTS
($ IN MILLIONS)

	TEC	FY 1991 REQUEST	FUTURE YEARS
90-D-102 NUCLEAR WEAPONS RD&T FACILITIES REVITALIZATION, PHASE III, VL			
-WEAPONS SUBSYSTEMS LABORATORY, LANL	$ 56.8	$ 2.0	$ 54.8
-ELECTRICAL POWER SYSTEM REPLACEMENT AND UPGRADE, LLNL	40.0	4.0	36.0
-POWER DISTRIBUTION SYSTEMS, NTS	12.7	1.0	11.7
-CRANE AND DRILL RIG CERTIFICATION BUILDING, NTS	2.7	1.7	1.0
-REACTOR TECHNOLOGY CENTER, SNLL	30.0	4.9	25.1
-UTILITIES UPGRADE--SANDIA MAIN ELECTRICAL SERVICE AND SWITCHGEAR, SNLL	5.3	2.0	3.3
TOTAL RD&T NEW STARTS	$147.5	$ 15.6	$131.9

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CHART 27

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

WEAPONS RESEARCH, DEVELOPMENT AND TESTING
($ IN MILLIONS)

PROJECT #	TITLE	TEC	PRIOR YEARS	FY 1991 REQUEST	FUTURE BA
88-D-105	SPECIAL NUCLEAR MAT'LS R&D LAB REPLACEMENT, LOS ALAMOS NATIONAL LABORATORY	$370-410	$75.3	$20.6	$285-325

DESCRIPTION

- o 115,000 SQUARE FOOT LABORATORY BUILDING, A 50,000 SQUARE FOOT COLD SUPPORT AND OFFICE BUILDING, A 10,000 SQUARE FOOT UTILITY BUILDING, A WASTE PRETREATMENT FACILITY AND A PROTECTED AREA ACCESS PORTAL
- o PROVIDES FOR DECONTAMINATION AND PARTIAL CONVERSION/REFURBISHMENT OF CHEMISTRY AND METALLURGY RESEARCH (CMR) BUILDING

JUSTIFICATION

- o MAINTAINS UNIQUE LANL ANALYTICAL CHEMISTRY/METALLURGY LABS TO IMPROVE NATIONAL NUCLEAR WEAPONS CAPABILITY
- o NEW LABORATORY REPLACES AGING CMR BUILDING WITH RELIABLE, SAFE AND SECURE CENTER OF EXCELLENCE

STATUS

- o THE COST, SCHEDULE, AND SCOPE OF THIS PROJECT ARE UNDER REVIEW. THE EIS PROCESS HAS STARTED

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CHART 28

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

ENVIRONMENT, SAFETY AND HEALTH CONSTRUCTION
($ IN MILLIONS)

	TEC	PRIOR YEARS	FY 1991 REQUEST	FUTURE YEARS
91-D-125 ES&H, PHASE III, MOUND	$ 2.9	$ 0	$ 1.7	$ 1.2
91-D-126 HEALTH PHYSICS CALIBRATION FAC., MOUND	5.0	0	1.0	4.0
91-D-127 CRITICALITY ALARM & PROD. ANNUNCIATION UTIL. REPLACEMENT, RF	19.0	0	6.6	12.4
90-D-126 ES&H ENHANCEMENTS, VL	80.7	21.6	8.5	50.6
89-D-126 ES&H UPGRADE, PHASE II, MOUND	1.4	0.9	0.5	0
88-D-124 FIRE PROTECTION UPGRADING, VL	15.0	13.5	1.5	0
88-D-126 PERSONNEL RAD MONITORING LAB, VL	7.6	6.0	1.6	0
SUBTOTAL, ES&H CONSTRUCTION	$131.6	$ 42.0	$ 21.4	$ 68.2

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CHART 29

DEFENSE PROGRAMS — WEAPONS ACTIVITIES

UNCLASSIFIED

SAFEGUARDS AND SECURITY CONSTRUCTION
($ IN MILLIONS)

	TEC	PRIOR YEARS	FY 1991 REQUEST	FUTURE YEARS
91-D-124 SAFEGUARDS AND SECURITY UPGRADE, PHASE III, MOUND	$ 13.8	$ 0	$ 1.1	$ 12.7
88-D-104 S&S UPGRADE, PHASE II, LANL	15.3	11.8	1.0	2.5
88-D-123 SECURITY ENHANCEMENT, PANTEX	109.7	18.6	18.2	72.9
87-D-104 S&S ENHANCEMENT, PHASE II, LLNL	29.4	24.4	0	5.0
85-D-105 COMBINED DEVICE ASSEMBLY FAC., NTS	73.6	69.4	4.2	0
SUBTOTAL, SAFEGUARDS & SECURITY CONSTRUCTION	$241.8	$124.2	$ 24.5	$ 93.1

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STATEMENT OF ROBERT J. WALSH
DEPUTY ASSISTANT SECRETARY FOR INTELLIGENCE
U.S. DEPARTMENT OF ENERGY

FY 1991 APPROPRIATIONS HEARINGS

INTRODUCTION

Mr. Chairman and members of the Committee, I am Robert J. Walsh, Deputy Assistant Secretary for Intelligence (DASI) for the Department of Energy (DOE). It is my pleasure to provide this testimony today regarding the Department of Energy's Intelligence programs with particular focus on the FY 1991 budget request for the Analytical Support/Intelligence, Threat Assessment, and Counterintelligence program elements of the Verification and Control Technology portion of the Defense Programs budget.

It will come as no surprise to you that DOE's intelligence activities have been severely challenged during the past year. In addition to the Department's traditional intelligence interests, Secretary Watkins has expanded its role in support of Departmental initiatives and national policies to include the development of a comprehensive National Energy Strategy, safe and environmentally sound disposal of radioactive waste, strengthening the domestic energy industry's ability to compete in the international marketplace, and improving our understanding of the potential global climate change.

Meanwhile, the evolving relationship with the Soviet Union, the Warsaw Pact, and our allies has demanded significant alterations in the focus and emphasis of nuclear related and scientific and technical intelligence. They have also indicated the importance of having a strong Counterintelligence program.

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MISSION

The Foreign Intelligence, Threat Assessment, and Counterintelligence missions under the Office of the Deputy Assistant Secretary for Intelligence are fixed by statute (e.g., the Atomic Energy Act of 1954, the Department of Energy Organization Act of 1977), executive order (e.g., Executive Order 12333, "United States Intelligence Activities"), and policy responsibilities resting in the Department of Energy.

Although organizationally positioned within the Office of Defense Programs, the DASI is a Department-wide support organization, providing intelligence and threat assessment support to the various elements throughout the Department. In addition, DASI staff personnel represent the Department through membership on various Director of Central Intelligence level groups

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DASI personnel also represent the Department on various Interdepartmental Groups on terrorism and counterintelligence.

Analytical Support - Intelligence

The mission of the Department's Foreign Intelligence program is driven primarily by Executive Order 12333. The DOE is tasked by this order to produce and disseminate foreign intelligence necessary for the Secretary of Energy's responsibilities; provide expert technical, analytical, and research capability to the Intelligence Community (IC); formulate intelligence collection and analysis requirements where expert capability of DOE can contribute; and participate with the Department of State in overtly collecting information with respect to foreign energy matters. Substantive elements of the Intelligence program include weapons intelligence, proliferation intelligence, foreign technologies assessments, foreign space applications, and energy resources intelligence.

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As I have mentioned, Secretary Watkins is using intelligence in new ways in DOE. He has requested the publication of a National Intelligence Estimate to form the international context for a comprehensive National Energy Strategy;

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and we are enhancing our analysis of nuclear reactor safety issues. We expect to continue to identify similar requirements.

Meanwhile, the nature and scope of the Department's longstanding intelligence analysis programs will need to be altered by rapidly changing international events

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International events that affect production, inventories, and consumption of fossil fuels, in conjunction with economic developments dictated by market conditions or the Organization of Petroleum Exporting Countries, must be fully assessed in terms of impact on the U.S. Strategic Petroleum Reserve and the overall U.S. energy posture.

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Threat Assessment

The mission of the Threat Assessment program is to provide assessments of hostile threats to the Department's facilities and conduct a special technology research and development program DELETED

The Office of Threat Assessment (OTA), which was initially established in 1986, consolidates the DOE threat analysis activities within a single office. OTA provides a "fusion center" where foreign intelligence and domestic information can be combined to provide a comprehensive review and timely assessment of actual or potential threats to DOE facilities and programs. DOE policy and decision makers, and all DOE and DOE-supported operations, are provided with timely intelligence on actual and potential adversaries throughout the United States.

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Counterintelligence

The mission of the Counterintelligence (CI) program is to develop, conduct, and oversee a Department-wide CI program. The program is conducted in coordination with the U.S. Intelligence Community to counter (identify and neutralize) the espionage and related foreign intelligence services threats to DOE national security facilities and programs, and DOE and DOE-contractor personnel.

The program assists in establishing and monitoring CI programs in DOE field facilities, serves as the focal point for liaison with the CI elements in the U.S. Intelligence Community, performs CI analyses of issues affecting the security of DOE and its field facilities, promotes and assists in organizing CI awareness training for DOE Headquarters and field elements, and develops and manages offensive counterespionage activities. The increasing number of exchanges and dialogues with the Soviet Union and Warsaw Pact nations has escalated dramatically the opportunities for hostile intelligence services to target DOE facilities. Hence, the challenge will be to be both responsive to the need for data exchange while maintaining the security of information vital to national defense.

1991 FUNDING REQUEST

The FY 1991 budget request for Foreign Intelligence, Threat Assessment, and Counterintelligence activities *DELETED* represents an increase *DELETED* *DELETED* over the FY 1990 funding level. *DELETED* $2.6 million is for initiation of construction activities for the Foreign Technology Assessment Center at the Lawrence Livermore National Laboratory and the remainder is designed to provide the Department with the improved capabilities needed to respond to the changing Departmental requirements and world events.

Analytical Support - Intelligence

The FY 1991 budget request DELETED supports a wide range of ongoing nuclear related foreign intelligence activities for which the DOE is responsible.

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The funding also supports foreign intelligence programs on advanced technologies DELETED

Funds also support assessments of foreign energy supply programs (e.g., oil, gas, electricity, etc.)

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In addition, the FY 1991 budget request supports new or expanded activities consistent with the Department's expanded role for intelligence and additional Intelligence Community requirements.

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Threat Assessment

The FY 1991 budget request of $11.7 million supports the Threat Assessment and Special Technology programs.

The Communicated Threat Credibility Assessments program provides assessments of nuclear extortion threats, conventional threats against DOE facilities, and actual or potential black market transactions in nuclear material. The budget request is to maintain the program at the existing level of effort.

The Programmatic Threat Assessment program provides a continuous review and assessment of real or potential threats to DOE programs and facilities. This program provides for: coordination of information requirements with appropriate Federal, State, and local government organizations; maintaining and implementing appropriate DOE directives, regulations, and procedures governing information collection, analysis, storage, and dissemination (these activities are carried out in consultation with the DOE General Counsel and the Department of Justice); and preparation and dissemination of finished analyses that are used in support of specific operations (e.g., nuclear material movements) and to provide information for use by those responsible for security and implementation. In addition, the OTA coordinates a threat assessment infrastructure within the DOE Headquarters and field elements and coordinates a nuclear terrorism education program for the Intelligence Community. The budget request provides for strengthened local/regional programs by expanding the threat assessment infrastructure into areas not presently covered.

The Special Technology program applies the unique expertise that exists within the DOE laboratories and contractors to assist in the counterterrorism efforts

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DOE efforts are coordinated with the Terrorism Intelligence Community and with the Intergovernment Group on Terrorism. The budget request will maintain the program at the existing level of effort.

Counterintelligence

The FY 1991 funding request for the Counterintelligence program is $2.0 million. The Counterintelligence program provides centralized management and structure and strengthens the Department's capability to identify and neutralize espionage directed at DOE programs vital to U.S. national security.

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The FY 1991

budget request supports the continued development of the DOE-wide program designed to detect, deter, and defeat the ongoing espionage threat from foreign intelligence services to DOE facilities, programs, and personnel.

The additional funds will be used to support the continued development and offer additional sessions of the DOE Counterintelligence Awareness Training program; DELETED and upgrade Headquarters counterintelligence assistance to DOE field facilities.

Foreign Technology Assessment Center

The FY 1991 request contains $2.6 million to commence construction of the Foreign Technology Assessment Center at the Lawrence Livermore National Laboratory. The total estimated cost is $20.0 million. The Center is urgently needed to house DELETED programs currently, and unacceptably, located in temporary facilities throughout the laboratory. The Center will greatly enhance the ability to accomplish DELETED program objectives.

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The Foreign Technology Assessment Center will serve as a national asset and foster the furtherance of *DELETED* national security efforts in support of DOE and national policies.

PROGRAM DIRECTION/STAFFING

The FY 1991 budget request *DELETED* provide salaries, personnel benefits, and travel expenses

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CONCLUSION

It has been my pleasure to provide to you this overview of the DOE Intelligence programs and to outline our FY 1991 budget request. As always, if I can be of further assistance in providing additional details on DOE Intelligence programs, I will be pleased to meet with you or your appropriate staff personnel at your convenience.

STATEMENT OF VICTOR ALESSI
DIRECTOR, OFFICE OF ARMS CONTROL
U.S. DEPARTMENT OF ENERGY
FY 1991 APPROPRIATIONS HEARING

INTRODUCTION

Mr. Chairman and Members of the Subcommittee, I welcome this opportunity to present to you the activities of the Office of Arms Control, an organizational entity reporting directly to the Assistant Secretary for Defense Programs within the Department of Energy.

The Department has a deep, enduring and growing interest and involvement in a variety of current arms control activities. The Department's interest in arms control has expanded from its traditional interest and expertise in evaluating nuclear testing limitations to include the entire range of arms control negotiations.

MISSION

The Office of Arms Control is responsible for developing and coordinating the Department's positions, policies, plans, and procedures relating to the arms control process, and for verification technology development. Since the establishment of the Office we have been in a particularly exciting period of international arms control activity. Arms Control and related technology activities are proceeding at an unprecedented pace. The U.S. is negotiating across a broad range of arms control fora such as START, Nuclear Testing, Defense and Space, Chemical Weapons, Implementation of the INF Treaty, and Conventional Forces in Europe. The Department of Energy is involved in all of these fora.

ORGANIZATION

The Office of Arms Control is composed of two divisions: The Policy and Technical Analysis Division and the Systems and Technology Division. The Policy and Technical Analysis Division directs the development and coordination of DOE positions, policies, plans and procedures relating to arms control matters. It also is responsible for supporting interagency, intragovernmental, and international deliberations, negotiations, and treaty implementation activities. The Systems and Technology Division is responsible for developing technology and fabricating systems that will provide technical capabilities needed to verify compliance with existing treaties, treaties being implemented, treaties still in negotiation, and treaties under consideration.

Our activities are spread throughout the Department's national laboratory system. While the majority of the funding goes to the weapons laboratories because of the unique character of their nuclear expertise and their extensive experience in developing verification technologies, we have made a conscious effort to bring other DOE laboratories into the process of developing arms control verification technology.

FY 1991 FUNDING REQUEST

The Arms Control Program, along with the Intelligence Program, is funded under the Verification and Control Technology budget. The total Verification and Control Technology budget request for Fiscal Year 1991 is $174.0 million. The Arms Control portion of the Verification and Control Technology budget for Fiscal Year 1991 is $129.5 million compared to $130.5 million for FY 1990.

Detection Technology

Under Detection Technology, research and development activities are funded as necessary to provide technical verification of compliance with arms control treaties. The research and development takes place primarily in the national laboratories, and is programmatically structured to support verification of treaties in effect, in negotiation, and under consideration. For example, we have developed or are developing systems to verify compliance with the Limited Test Ban Treaty, Threshold Test Ban Treaty, Peaceful Nuclear Explosions Treaty, and Intermediate Range Nuclear Forces Treaty as well as a future Strategic Arms Reduction Treaty, Chemical Warfare Treaty, Conventional Forces in Europe Treaty and the Open Skies initiative. The range and scope of the technologies necessary to support verification of these diverse treaties must be broad and sophisticated. For example, instrumentation is being developed to operate in seismic boreholes; to operate on geostationary satellites; to cover signals with frequencies from fractions of a hertz to those of gamma rays; to measure masses as small as one millionth of a millionth of a thousandth of a gram; and to measure energies equivalent to that released by the explosion of a thousand-million pounds of TNT. Our verification requirements involve a wide range of capabilities many of which are unique. We have organized our Detection Technology Program into four functional areas: (1) On-site Verification; (2) Regional monitoring; (3) Remote Sensing; and (4) Advanced Concepts/Technology Development.

On-Site Verification activities are composed of systems and technologies that are used to monitor treaties with the cooperation of the inspected party. An example of on-site activity in which our verification systems were used, was the recent Joint Verification Experiment during which we measured the yield of a Soviet nuclear explosion by using a Department of Energy developed system called Continuous Reflectometry for Radius versus Time EXperiment (CORRTEX) at the Semipalatinsk Test Site. This CORRTEX system will be used for monitoring some tests once the Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty are completed and ratified.

Regional Monitoring activities include developing seismic systems and data processing capabilities that we could deploy within the Soviet Union. Toward that objective, we have fabricated the Deployable Seismic Verification System (DSVS). The first five units are now available for deployment within the U.S.S.R. in a cooperative mode. We have also designed and fabricated the Configurable Seismic Monitoring System (CSMS) should the negotiations specify the use of a portable non-permanent seismic system.

Remote Sensing activities have been in place for over a quarter of a century. An example of our verification efforts in this area is the satellite instrumentation effort for worldwide monitoring of the Limited Test Ban Treaty. This capability which consists of the sensors and systems for detection of nuclear detonations (endo- and exo-atmospheric as well as in deep space) is a major element of the Remote Sensing activity. The other major element is the development of new satellite sensing techniques that cover portions of the electromagnetic spectrum beyond the visible region.

In the Advanced Concept/Technology Development activity we try to extend the frontiers of science and technology in ways that would be useful for future verification needs. This is where we test the technical feasibility of new ideas, develop technologies that might be applicable to more than one treaty regime, and fabricate systems for the technical intelligence collection community. Several technologies, such as tagging, are showing promise for ensuring effective verifiability of treaties being negotiated such as the Chemical Warfare Convention (CWC) and the Strategic Arms Reduction Treaty (START).

It is important to emphasize the versatility and quality of the technical support we receive from the national laboratories. We consider the technical expertise, which has evolved from the nuclear weapons programs at the laboratories, to be a national asset in terms of arms control verification technology development. While we have attempted to maintain a stable level of resource allocations to the laboratories, we have also planned our activities in a way that allows us to begin and complete explicit projects in an orderly and efficient manner. To this end we have developed a five year plan for each of our projects, including a statement of work, milestones, and deliverables. We believe that, because of our ability to tap the resources of technical expertise at the national laboratories, we at the DOE's Office of Arms Control have a unique capability to apply that expertise to all of the Nation's arms control treaty verification needs. By handing over completed projects to those who will use the systems and technologies in the implementation of treaty verification, we are able to keep DOE's activities continually pushing the state-of-the-art in research and development, while leaving operations to those who are assigned that responsibility. In this way we have minimized duplication and enhanced cooperation and coordination with other organizations.

One of the more difficult tasks is the selection of those projects which may improve verification capability for future arms control treaties not yet being negotiated. Since policies may change as a result of public, fiscal, or congressional activities, or international events, and since technology development may take up to ten years, we believe it is prudent to have long term technology development in support of generic requirements. For this reason we are developing future technologies which are not directly related to current U.S. arms control policies and initiatives. For arms control agreements now being negotiated where the verification requirements are better defined we are drawing upon existing technology and adapting it to meet those requirements.

Analytical Support

The Analytical Support activity is managed by the Policy and Technical Analysis Division. The Department has a major and increasingly important interest in the pursuit and outcome of ongoing arms control negotiations. This is most evident with regard to nuclear testing and weapons where the Department and its national laboratories actively participate in the international negotiating process and are directly affected by resulting treaties, protocols, and implementing procedures. In addition, we are involved in analytical support for the full spectrum of arms control treaties being negotiated. It is essential that preparation for negotiations involve thorough analysis of the options available to the U.S. including assessment of their impact on U.S. and allied security postures and of their effective verifiability.

In addition to Department representation in interagency and international arms control activities being conducted under the heading of Analytical Support, supporting studies and analyses are also conducted under this budget category. An effort that illustrates how analytical studies support DOE's participation in arms control negotiations and policy development is the planning and conduct of exercises and mock challenge inspections at sensitive Department facilities. These exercises advance on-site inspection readiness, planning capabilities, and assist the verification inspection process. We are evaluating the relative merits of alternative approaches to inspections and sharing the results with other departments and agencies. Another example of analysis involves studies on potential future treaty warhead dismantlement provisions and alternative disposition of derived special nuclear materials.

Although DOE contributes across the spectrum of arms control activities, several arms control tasks are uniquely DOE's. For example, we must make test limit negotiation positions consistent with U.S. nuclear deterrent needs.

Construction

Finally, to support various efforts in verification and control technologies, we need a facility that will serve as a focus for related technical activities in national security and arms control. Accordingly, we are requesting $10,000,000 in FY 1991 to continue work beginning in FY 1990 on the Center for National Security and Arms Control at Sandia National Laboratories in Albuquerque. This facility will support systems analysis, advanced concepts, ground-based verification, satellite monitoring, intelligence, and threat and countermeasures activities. It is the only designated arms control facility in the Defense Complex of the Department of Energy.

CONCERN

I should point our that our request does not support implementation of any on-site verification activities in the Soviet Union, which could result from the entry into force of the Threshold Test Ban Treaty and Peaceful Nuclear Explosions Treaty. In addition, new arms control initiatives may require adjustments and additions to programs to develop verification systems.

In conclusion, we feel that these are exciting times in the arms control arena and the Department is moving vigorously and forcefully ahead in applying the technical expertise residing at the national laboratories to the verification challenges of this arena.

BIOGRAPHICAL DATA

Victor E. Alessi

Dr. Victor E. Alessi is the Director of the Office of Arms Control in the Department of Energy (DOE). His duties include overseeing DOE involvement in arms control issues and verification technology development. His responsibilities include representing DOE in interagency policy meetings on arms control. He was previously the Deputy Director of the office of International Security Affairs.

Prior to joining DOE in January 1987, he was the Chief of Strategic Affairs Division of the Arms Control and Disarmament Agency. In that capacity he had responsibility for the Strategic Arms Reductions Talks (START), Antisatellite Arms Control, Defense and Space (D&S) negotiations, and the Standing Consultative Commission (SCC). He served on the SALT II, START, and INF delegations.

Dr. Alessi graduated from Fordham University in 1963 and received a Licentiate in Philosophy from the University in 1964. He studied nuclear physics at Georgetown University where he received an M.S. in 1968 and a Ph.D. in 1969.

He lives in Fairfax, Virginia with his wife and four children.

October 4, 1988

Statement of William Barker
Acting Deputy Assistant Secretary for Security Affairs
Department of Energy
FY 1991 Appropriations Hearings

INTRODUCTION

Mr. Chairman and members of the Committee, I am William Barker, Acting Deputy Assistant Secretary for Security Affairs (DASSA). I am pleased to address the Department of Energy's Security Affairs programs of Nuclear Safeguards and Security (including Classification and Technology Policy), and Security Investigations, and the FY 1991 budget request required to carry out these programs.

Mr. Chairman, this is my first opportunity to appear before this Committee, and I want you to know that I intend to keep you fully and currently informed on Security Affairs activities of interest to your Committee. I will routinely communicate program initiatives and areas of concern to you and the Committee. I will be pleased to meet with you, Committee members, or the Committee staff at any time to discuss matters of interest.

SAFEGUARDS AND SECURITY TASK FORCE

Before I discuss the details of the critical role Security Affairs fulfills in the Department's national security mission, I would like to provide you with the status on Secretary Watkins' review of safeguards and security at DOE facilities. As part of the Secretary's overall review of DOE operations, he asked Under Secretary John Tuck in April 1989 to conduct a comprehensive assessment of the status of security at DOE facilities. The Under Secretary outlined a four-step plan and formed a task force of uniquely qualified individuals to accomplish the review. The plan includes an examination of missions, responsibilities, and objectives of Departmental elements in support of security; evaluation of previous studies, reviews, and inspections; an intensive analysis of selected facilities and functions; and preparation of a comprehensive report.

The task force has provided the Secretary an interim status report which highlights several items requiring attention by all Departmental elements, as well as several safeguards and security activities that deserve special recognition for a job well done. Areas of concern included classified document control, nuclear material control and accountability (MC&A), the clearance process, control of foreign visits, and protective force qualifications and training. The task force is continuing its review and plans to present a final report in March 1990. Please be assured, Mr. Chairman, that we are already addressing many of these concerns.

SECRETARY'S ANNUAL REPORT

The Secretary's Annual Report to the President on Domestic Safeguards and Security, completed in November 1989, included information from the Secretary's task force review. A new concept was utilized for the preparation of the Annual Report. The Department established a profile system for evaluating safeguards and security at Departmental installations. The system is based on the results of inspection and oversight activities and requires rating various aspects of protection at each site by those responsible for facility operations. The ratings ("satisfactory," "marginal," or "unsatisfactory") are further reviewed and evaluated by DOE Headquarters.

This evaluation confirmed that our ability to mitigate the potential outsider threat is at an acceptable level at our nuclear weapons facilities. Sustained management attention to physical security upgrades and the strengthening of DOE's protective forces contributed to this accomplishment. Over the last several years, the Department has substantially increased protective forces which are better trained and better equipped and are now a proactive force capable of protecting our national security assets. In addition, the use of helicopters at four of our larger DOE sites provides enhanced surveillance and response for security emergencies. Facility protection at our critical sites has been improved with the completion of major construction projects. High-tech perimeter detection systems have been installed at almost all our facilities. Lastly, our fabric for deterrence --access controls, barriers, hardened sites, and security response team capabilities -- is as good as any security system in the United States.

This evaluation also confirmed the need for the Department to shift the emphasis of our safeguards and security program to development of systems and strategies to mitigate the potential insider threat. Progress has been made to address the insider but at a much slower pace than we would like.

Seven of 20 nuclear weapons facilities were rated "marginal," in the November 1989 Report to the President, due to deficiencies in programs and systems critical to protection against the potential insider threat. Some improvement, however, has been made in addressing this potential threat by stressing fundamental programs to deter and reduce the likelihood of hostile acts by an insider, and to detect and mitigate the consequences of such acts.

A number of actions have been initiated to also address potential acts of theft of special nuclear material (SNM) by insiders. The Department is implementing performance-oriented requirements to allow more cost-effective expenditures of resources for MC&A systems. Improvements in MC&A practices are being emphasized at key sites. The safeguards and security technology development program has produced advances such as better site portal monitors for detecting removal of SNM, and better measurement equipment and data systems designed to increase the assurance that nuclear material accounting records are not falsified by exploiting measurement uncertainties or accounting records. Measurement systems installed in-line at many facilities permit more timely and accurate determination of material in process. The above are designed to provide a defense-in-depth approach. We have also organized teams of experts to investigate and determine causes of incidents involving the MC&A of special nuclear material.

We have made considerable progress, but much work remains to be done and future emphasis will continue in assuring adequate protection against the potential insider threat.

MISSION

The Security Affairs programs are the Department's cornerstone in: developing and implementing policy, guidelines and procedures to prevent the theft of nuclear weapons or materials, the sabotage of facilities, and the compromise of classified information; providing an effective technology base for application to Departmental safeguards and security programs; supporting international safeguards and physical protection to deter the diversion of nuclear materials and to promote nonproliferation and national security objectives; developing and implementing policy for managing the classification and declassification of information; controlling proposed exports of nuclear materials technology and equipment; and implementing a program to transfer unclassified technology from our defense complex to U.S. industry.

BUDGET

Security Affairs requests $156 million for FY 1991. This consists of $91.0 million for Nuclear Safeguards and Security (including $8.1 million for Classification and Technology Policy) and $65.0 million for Security Investigations.

NUCLEAR SAFEGUARDS AND SECURITY PROGRAM ACTIVITIES

Mr. Chairman, the Nuclear Safeguards and Security Program budget request for FY 1991 is $91.0 million. Operating expenses require $83.9 million (includes $8.1 million for Classification and Technology Policy), capital equipment $5.1 million, and general plant project construction of $2 million. I will address the following basic elements: safeguards and security operations, technology development, international safeguards, and classification and technology policy.

SAFEGUARDS AND SECURITY OPERATIONS

Elements in this budget category include such activities as the New Brunswick Laboratory (NBL); the Nuclear Materials Management and Safeguards System (NMMSS); the Central Training Academy (CTA); Technical Security Countermeasures (TSCM) program; and guidance and assistance to DOE field operations for safeguards and security program improvements.

The New Brunswick Laboratory, Argonne, Illinois, is the national standards laboratory for nuclear materials measurements and serves as the technical extension of the Office of Safeguards and Security in the areas of measurement science, calibration, and evaluation of material accountability. NBL's functions include: maintaining and improving an internationally-compatible reference base for nuclear material measurements; assessing measurement technology in support of the DOE nuclear fuel cycle and weapons production activities; developing, certifying, and distributing reference materials for calibration and standardization of nuclear material measurements; and assisting in technology exchange and training in safeguards measurement technology.

In cooperation with the Nuclear Regulatory Commission (NRC), we will continue to operate the Nuclear Materials Management and Safeguards System (NMMSS), the nation's single nuclear material database, conducted at Oak Ridge, Tennessee. The tracking of US-origin nuclear material involving DOE contractors, NRC licensees, and foreign trading partners is integral to the mission for control of nuclear material. NMMSS maintains information needed by facilities to verify the shipment and receipt of nuclear materials to reconcile nuclear material inventories at DOE facilities.

The Central Training Academy (CTA) is the focal point for all Office of Safeguards and Security (OSS) training and dissemination of training doctrine. Training at the CTA covers the areas of physical security, protective force operations, security education, computer security, and material control and accountability. Standardization of training has assisted DOE in developing a protective force able to counter threats against the Department's nuclear materials and facilities. The CTA has seen a dramatic increase in classes offered from three courses in 1984 to over forty projected for FY 1991 and is recognized as a national training asset. We are proud of the advances made at CTA and will continue these improvements in FY 1991. The major portion of the funding increase will maintain existing facilities which in some cases are substandard. In addition, the Department is requesting General Plant Project funds of $2 million in FY 1991 for needed facility upgrades.

The DOE Technical Surveillance Countermeasures (TSCM) program protects against the theft of classified information by technical means. Modern intelligence collection utilizes equipment and devices incorporating state-of-the-art technology to accomplish technical penetrations of targeted areas. The detection of clandestinely installed devices is extremely difficult, and countermeasures are achieved only with highly trained personnel using specialized techniques and equipment. A program to certify the competency of DOE TSCM investigators is underway. These efforts in training and certification will significantly improve the overall technical security posture of the Department.

We have come to realize a more effective safeguards and security planning process was needed to consider long-term programmatic requirements and trends, identify strategic policy issues affecting the outyears, and identify actions which address concerns and vulnerabilities of the Department's critical facilities and assets. To answer the question "How much is enough," a corporate planning approach has been developed with Master Safeguards and Security Agreements (MSSAs) as the base planning documents. The program employs agreements between DOE Headquarters and field office management setting the site-specific protection levels at critical DOE nuclear sites and facilities. These agreements are, in effect, "living documents" that commit the parties to support graded safeguards and security systems. At present, MSSAs are planned for 47 DOE facilities and 18 have been approved. In support of the MSSA process, the standardization of vulnerability assessments within the Department has led to the development and use of sophisticated, user-oriented computer models. These models are critical for assessing the effectiveness of our facility protection programs and completing facility MSSAs. We will continue to emphasize the completion of the remaining agreements.

The Department recently provided the Congress with a report on the DOE's airspace initiative. The Federal Aviation Administration (FAA) and DOE are working together toward a goal of establishing new or expanded Prohibited Airspace over nine additional facilities. FAA and DOE have agreed to proceed with rulemaking to accomplish this goal. As an integral part of the process, we will hold informal public meetings at the nine locations this spring. The

Department will make every effort to be responsive to all public concerns. We have based our altitude and boundary proposals on extensive discussions with our field security staffs and have requested minimum altitudes consistent with our security and safety needs. Based on our discussions with the FAA we hope to have these restrictions in place by the Spring, 1991.

We are continuing efforts to improve security policies, practices and procedures for classified document control. We have begun the revision of DOE Orders which govern classified document control and are conducting a comprehensive secret document inventory. The most aggressive and visible areas of improvement have been in the education and training aspects of document control. Several courses of instruction have been proposed to ensure consistent and standardized classified information control throughout the DOE complex.

Another major safeguards and security initiative is the design of a standardized enhanced access control system to address the potential insider threat. Known as the Personnel Access Control and Security Enhancement System (PASS), it will feature a new, completely compatible photo credential that can be "programmed" to identify the individual badge holder and selected pertinent information. Additional development and enhancements will enable facilities to automatically restrict, localize, and record access, enforce the two-person rule, and expedite access authorization information among facilities. The Department plans to install a pilot system at the weapons laboratories to test the feasibility of a fully integrated, complex-wide approach.

Each year the national laboratories host many visitors and assignees from foreign countries under agreements for cooperation or on a scientist-to-scientist basis. These interactions are integral to the scientific process, but must be conducted according to sound security plans to prevent the inadvertent disclosure of classified or sensitive information. Last year, the Department issued an Order designed to improve physical and technology security and security awareness for the visits and assignments program. We are implementing this Order and results indicate objectives are being met. This is not to imply that we are completely satisfied, because more needs to be done. However, we are confident that the new requirements are clear and concise, and we will ensure that they are well understood. In the coming year, we will endeavor to ensure continuing improvements in the management of the foreign visits and assignments program at all DOE facilities.

TECHNOLOGY AND SYSTEMS DEVELOPMENT

Conducted at the national laboratories under Headquarters guidance, the Technology and Systems Development program is an integral part of Nuclear Safeguards and Security and provides the technology base for developing new systems required to sustain a viable safeguards and security program. The program's basic mission is to support the application of state-of-the-art technologies for protection of DOE facilities, property, classified matter, and SNM. The strategy is directed toward reducing risks and operational impacts. The Department's technology development program contributes to cost-effectiveness in all areas. Many benefits are realized through the use of technology to control manpower levels and through development of standardized systems. The use of new technologies to facilitate engineering design and specification for construction and equipment is also reducing our safeguards and security costs.

Continued fiscal constraints on the Nuclear Safeguards and Security Program are leading to a serious erosion of the technology base and expertise at the national laboratories. Unless the trend of the last several years is reversed, DOE will simply not have the technology available to improve our protection posture. The need is especially relevant to Departmental initiatives for modernization and plans for revitalization of the complex. We must strive to rebuild the safeguards and security technology base.

Identifying and addressing the technology development needs of the DOE community are important planning factors. Proposed projects are evaluated based on their potential to solve existing and future problems as identified by field offices and facilities. This provides emphasis for projects that offer potential, cost-effective solutions to known safeguards and security problems at multiple facilities. In addition to solving problems and improving safeguards and security capabilities, all proposed technology development projects are evaluated for their potential to reduce the operational outlay ("crosscut") estimates for safeguards and security. This provides incentive and leverage to improve both effectiveness and efficiency of the overall safeguards and security mission. Close coordination with the outlay programs is vital to accomplish this goal.

Disseminating the safeguards and security technology developed for the DOE complex to other Government agencies is also a high priority. We consider our DOE safeguards and security technology development program a unique national resource in assuring an awareness of technologies developed not only within the Department, but also in assuring awareness and coordination of technology development activities with other federal agencies. Exchange of information about safeguards and security technology is conducted through the dissemination of technical reports and manuals to appropriate audiences and end users and the conduct of training courses and workshops. We will continue to emphasize close interagency sharing and coordination to minimize costs and reduce redundancies.

We provide funding for the DOE classified computer security program through the Technology and Systems Development Program. A significant activity of the classified computer security program is the Center of Excellence for Computer Security at the Los Alamos National Laboratory. The Center provides support for the education and training of managers, computer security personnel, and information users. It also provides field support and conducts technology development for computer security.

INTERNATIONAL SAFEGUARDS

Our international safeguards program supports U.S. nonproliferation and national security objectives, as required by the Atomic Energy Act of 1954, the Nuclear Non-Proliferation Act (NNPA) of 1978, the Omnibus Diplomatic Security and Anti-Terrorism Act of 1986 and implementing Executive Orders and Presidential directives. The primary objectives are to provide a sound technical basis for U.S. policies and to strengthen international safeguards and physical protection through technical support to the International Atomic Energy Agency (IAEA) and cooperative efforts with other nations. These initiatives, especially the DOE/OSS long-range technology development program for international safeguards, reflect the close technological relationship between domestic and international safeguards.

We will continue bilateral technical exchanges on physical protection technology, continue technology development for new and improved systems for IAEA safeguards and advanced safeguards technologies and procedures to improve the efficiency of IAEA safeguards inspectors, and conduct an international training course on international safeguards at the national level for foreign nationals.

CLASSIFICATION AND TECHNOLOGY POLICY

The FY 1991 request for the Classification and Technology Policy program, which is incorporated in the Nuclear Safeguards and Security program budget, is $8.1 million, exclusive of program direction. In FY 1991, we will continue to manage Defense Programs' technology transfer activities, but funding for these activities has been requested in the weapons research and development budget.

The Classification and Technology Policy mission is to develop and implement policy and procedures to identify classified and unclassified sensitive information critical to the national security, control nuclear related exports, and implement technology transfer policies for Defense Programs.

The FY 1991 request will continue classification activities in program areas involving sensitive technologies, classification assistance to the Nuclear Regulatory Commission and the Department of State in matters pertaining to commercial uranium enrichment, implementation of automated systems to improve the effectiveness and efficiency of the classification program, education and training, classification appraisal program, and document review activities.

We have initiated a comprehensive classification policy study to determine if current DOE policies are adequate for the future, considering changing world conditions that are vastly different that those which existed in 1946 when the Atomic Energy Act was originally enacted.

Defense Programs has played a major role in developing and implementing nuclear export control policy to ensure compliance with U.S. national security and nuclear nonproliferation policy. We have been aggressively pursuing measures to control specific technologies that could assist a potential proliferant in the design or production of a nuclear explosive device. Events brought about by the political transition occurring in eastern Europe and the Soviet Union have increased pressure on the U.S. Government to identify those technologies and commodities which continue to pose a national security concern. We are involved in a major effort to revise international controls in the Coordinating Committee on Multilateral Export Controls (COCOM) and under International Atomic Energy Agency (IAEA) auspices to ensure international commerce will not undermine U.S. national security and nonproliferation interests. Similarly, we have a leadership role providing technical and policy expertise in support of the negotiation of major changes to existing international controls over nuclear fuel cycle components subject to international safeguards under the Zangger Trigger List.

At this time, I would like to recognize the Department's commitment to an aggressive program of technology transfer to U.S. industry. Defense Programs has a wealth of advanced technology that can be applied to strengthen the economic competitiveness of our country.

The recent enactment of the National Competitiveness Technology Transfer Act of 1989 amended the Atomic Energy Act to emphasize technology transfer as a mission of Defense Programs. We participated with other DOE elements in developing a strategy for implementing the legislation through a task force established by Deputy Secretary Henson Moore on January 31, 1990.

In FY 1990, we successfully developed and issued technology transfer guidelines and initiated two projects with industry. One project involves Departmental work with a consortium of eight U.S. companies to apply weapons program specialty metals technology for commercial uses. Technology in specialty metals will assist regaining U.S. competitiveness, provide domestic suppliers for weapons program metals and components, as well as keep the weapons program up-to-date with the latest technology. The second project is the Advanced Manufacturing Technology Initiative which will involve work with the National Center for Manufacturing Sciences. The National Center for Manufacturing Sciences represents over 100 U.S. companies involved in manufacturing. The area of machine tools is one particular part of manufacturing where we believe we can strengthen U.S. competitiveness by transfer of technology in an area targeted by our competitors. It is important to the weapons program since, in addition to assisting U.S. economic security, it will provide domestic suppliers for highly accurate machine tools needed for weapons production.

In FY 1991, we will continue to develop policy groundwork for implementing technology transfer in Defense Programs and cooperative agreements between the laboratories and U.S. industry. There will be a significant effort to evaluate project proposals and implement and monitor projects. In addition, we will continue the specialty metals consortium and the advanced manufacturing technology initiatives and plan to establish about six more technology transfer projects.

SECURITY INVESTIGATIONS

The FY 1991 request for personnel security investigations is $65.0 million. Security investigations are required by the Atomic Energy Act of 1954, as amended, and Executive Orders 10450 and 10865. The Department is mandated to use the Federal Bureau of Investigations and Office of Personnel Management (OPM) to conduct clearance investigations. The FY 1991 budget provides for 13,804 initial full-field investigations, 23,947 National Agency Checks, and 20,350 reinvestigations; and continued training for DOE hearing officers and personnel security specialists.

In 1986, we began a major initiative to reduce the numbers and levels of clearances, resulting in a 16-percent reduction of clearances from 209,000 to the current level of about 175,000. We have assured continued emphasis on this aspect of the program by requiring annual reviews and recertification of clearances for DOE and contractor employees, and other agency employees and contractors.

Mr. Chairman, let me emphasize the Department's commitment to reducing the security reinvestigations backlog. We have reduced the number of backlog reinvestigations from approximately 132,000 in 1985 to approximately 54,000 at the end of FY 1989. To keep pace with the 5-year reinvestigations requirement and continue to reduce the backlog, in FY 1990 we plan to conduct approximately 27,000 reinvestigations (of which 14,000 are contingent on proposed reprogramming action). The elimination of this backlog is essential so that we can ensure the integrity of our work force by maintaining current background data on our employees and removing individuals with derogatory information in their background from sensitive programs. We have been working with senior officials of the Office of Personnel Management (OPM) to insure that OPM is able to meet DOE needs for reducing the reinvestigations backlog. It is clear that OPM intends to make every possible effort to meet our needs contingent on Office of Management and Budget's approval of additional staffing.

One key component of our efforts to address the potential insider threat is the implementation of the Department-wide Personnel Security Assurance Program (PSAP) which will systematically monitor the reliability of selected DOE and contractor personnel. The PSAP is a special access authorization (security clearance) program for personnel who protect, transport, or have direct access to significant quantities of special nuclear material; operate nuclear material production reactors; or could cause grave damage to nuclear weapons production with the potential for significant impact on national security. The PSAP includes an annual supervisory review; medical evaluation, which includes a physical and alcohol dependency examination and a psychological assessment; management review, including drug testing; and security review. The DOE PSAP Order was issued and a final rule, which has completed the public review process, is in the process of final approval for implementation within the Department. A training program, which has been field-tested, will be implemented for individuals included in the program. A total of $7 million will be used for approximately 3,000 Special Background Investigations in FY 1990 to get this program started.

S&S CROSSCUT ESTIMATE

The DOE outlay programs fund safeguards and security activities at the Department's field facilities. Total safeguards and security funding is identified in the Department's crosscut estimate, which is a summation of safeguards and security items in all the Department's program requests, including the Office of Safeguards and Security. The Department's total crosscut estimate for FY 1991 is $956 million, compared to $866 million in FY 1990. The Defense Programs' portion is $777 million in FY 1991, compared to $699 million in FY 1990.

As the Departmental coordinator, Security Affairs has a broad range of responsibilities for crosscutting activities which include ensuring that program budget submissions properly reflect safeguards and security considerations. We validate the need for safeguards and security improvements, evaluate proposed upgrade designs for adequacy, and verify the performance of the upgrades once they are in place. This process is critical, if we are to assure continued protection system progress in upgrading our critical facilities and effective safeguards and security integration. Significant progress has been and continues to be made toward increasing the level of protection of our facilities and the protection of DOE assets. A good portion of this has been accomplished through manpower-intensive, quick-fix measures. The validation of major construction projects designed to provide long-term, permanent corrective action to vulnerabilities is critical to assuring effective safeguards and security integration and the replacement of existing systems with more state-of-the-art hardware and software protective measures. When this is accomplished, our safeguards and security program will be well along toward achieving our objectives.

CONCLUSION

Mr. Chairman, members of the Committee, let me conclude today by stating that the Department continues its commitment to excellence in safeguards and security. The Department's ability to mitigate the potential outsider threat is at an acceptable level at our nuclear weapons facilities. We recognize that much remains to be done to mitigate the potential insider threat, and are taking actions to correct this problem. We will continue to work with the Congress to ensure that the protection of the Department's national security assets are given the highest priority.

TUESDAY, MARCH 13, 1990.

ATOMIC ENERGY DEFENSE ACTIVITIES; NUCLEAR MATERIALS PRODUCTION; NEW PRODUCTION REACTORS; DEFENSE NUCLEAR FACILITIES SAFETY BOARD

WITNESSES

JOHN C. TUCK, UNDER SECRETARY, AND ACTING ASSISTANT SECRETARY FOR DEFENSE PROGRAMS

RICHARD W. STAROSTECKI, ACTING DEPUTY ASSISTANT SECRETARY FOR NUCLEAR MATERIALS

DR. DOMINIC J. MONETTA, DIRECTOR, OFFICE OF NEW PRODUCTION REACTORS

JOHN T. CONWAY, CHAIRMAN, DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Mr. BEVILL. We have a few housekeeping details here. Pursuant to the decision of the committee last Thursday, the hearing for today will be closed. Only those who have proper clearances will remain in the room.

Secretary Tuck, would you please see that only those who have proper clearances are in the room?

Mr. TUCK. Yes, sir, Mr. Chairman. I have been assured that is the fact.

Mr. BEVILL. I would like to remind the members of the committee not to remove any materials from the hearing room, as much of it is classified.

Secretary Tuck, we are pleased to have you with us again today. You may proceed as you wish.

Mr. TUCK. Thank you, Mr. Chairman. I have no further statement for today. I stand ready to answer any questions you may have.

NUCLEAR MATERIALS PRODUCTION

Mr. BEVILL. All right. We will hear from Mr. Starostecki.

Mr. STAROSTECKI. This is my first appearance before the Committee in the capacity of Acting Deputy Assistant Secretary for Nuclear Materials.

Mr. BEVILL. We are pleased to have you with us.

Mr. STAROSTECKI. Thank you.

I would like to amend my testimony for the record with some additional information which will replace the prepared statement that was provided previously.

Mr. BEVILL. Yes, without objection, it is so ordered. You may do that within the next five days.

Mr. STAROSTECKI. Thank you very much, Mr. Chairman.

I would like to make a brief presentation of the highlights that are presented in the testimony. We have detailed budget presentations by site.

I would like to go through a brief description of nuclear materials flows, as we refer to them, and where we stand today.

As you know, last year the emphasis was on tritium. In preparing this year's budget, I thought it worthwhile to reflect on the fact that the restart of the Savannah River reactors and the Savannah River Site is consuming about two-thirds of the Nuclear Materials budget.

[Slide follows:]

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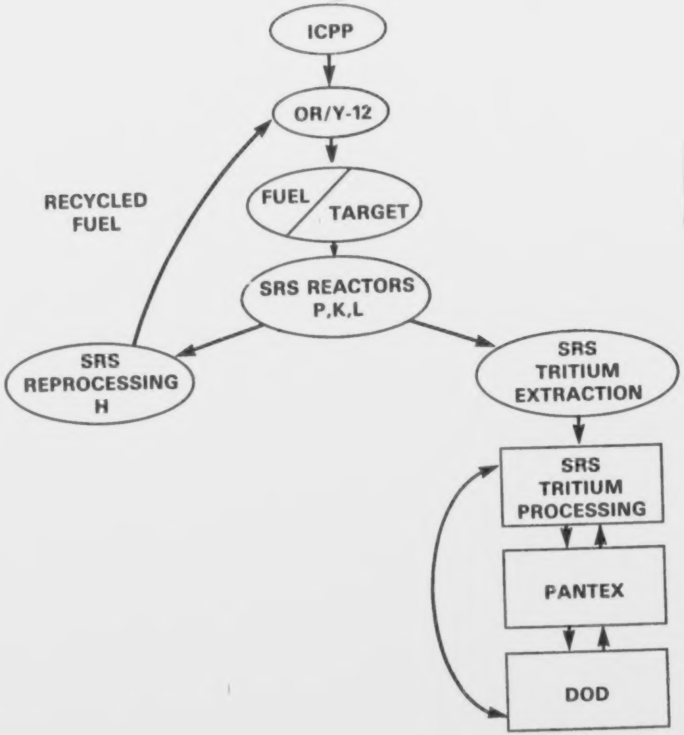
TRITIUM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IRRADIATION

SEPARATION/
PURIFICATION

WEAPONS ASSEMBLY

STOCKPILE

UNCLASSIFIED

MT 0309

Mr. STAROSTECKI. The facilities do not operate in isolation. We have the Idaho Chemical Processing Plant, ICPP, in Idaho which recycles fuel for Savannah River by processing spent naval reactor cores from the naval nuclear propulsion program. We extract the usable material at ICPP and convert it into the right form at Oak Ridge in a small facility at Y-12. We fabricate the fuel and target material for the reactors at the Savannah River Plant.

We have funding for work at Oak Ridge and Idaho also.

The tritium extraction occurs at Savannah River. We load the bottles for delivery at Pantex. Increasingly, over the last two years, as was discussed yesterday, a major portion of our tritium supply has been through returns from retired weapons from the Department of Defense back to the Savannah River Plant for further use.

This chart is really intended to show that we are in fact looking at the tritium supply as an integrated system. We have in fact started major upgrades and modernization to the Idaho Chemical Process Plant. We hope in the next few years to finish upgrading the facility. We look to the future in meeting the needs of both Naval Reactors and DOE.

I apologize for the confusion on this curve, but we are trying to show two things.

Mr. BEVILL. If I may interrupt before you leave the issue of tritium, when will you have that on line again.

Mr. STAROSTECKI. The Savannah River reactors?

Mr. BEVILL. Yes.

Mr. STAROSTECKI. We will be talking about it in more detail. We are looking at starting up of the Savannah River reactors the third quarter of this year.

Mr. BEVILL. Yes, that was testified to yesterday. Okay

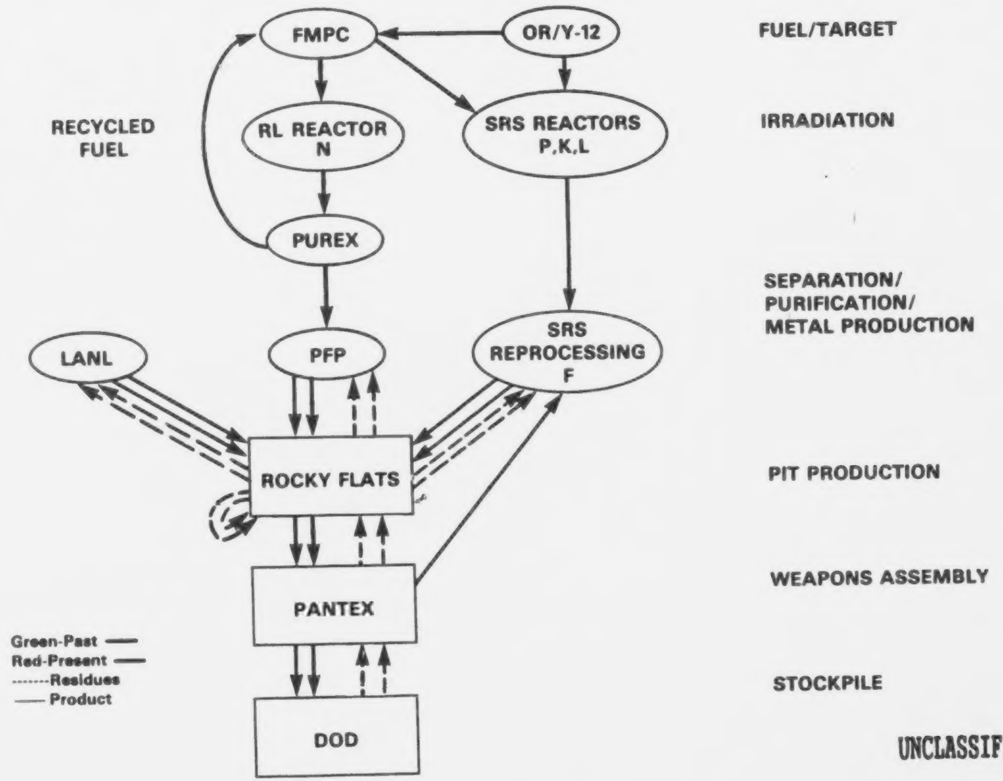
Mr. STAROSTECKI. I will get into more detail on that later on.

Mr. BEVILL. All right.

[Slide follows]:

UNCLASSIFIED

PLUTONIUM


FMPC
OR/Y-12
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SEPARATION/ PURIFICATION/ METAL PRODUCTION
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PFP
SRS REPROCESSING F
ROCKY FLATS
PIT PRODUCTION
PANTEX
WEAPONS ASSEMBLY
DOD
STOCKPILE
Green-Past —
Red-Present —
-------Residues
—— Product

UNCLASSIFIED

Mr. **Starostecki.** This chart reflects the way things used to be historically. We have tried to show it in color in green on top where we would use both the Richland N reactor and the Savannah River reactors to produce virgin plutonium. We no longer operate the N reactor for production of plutonium and no longer plan to use the Savannah River for plutonium production.

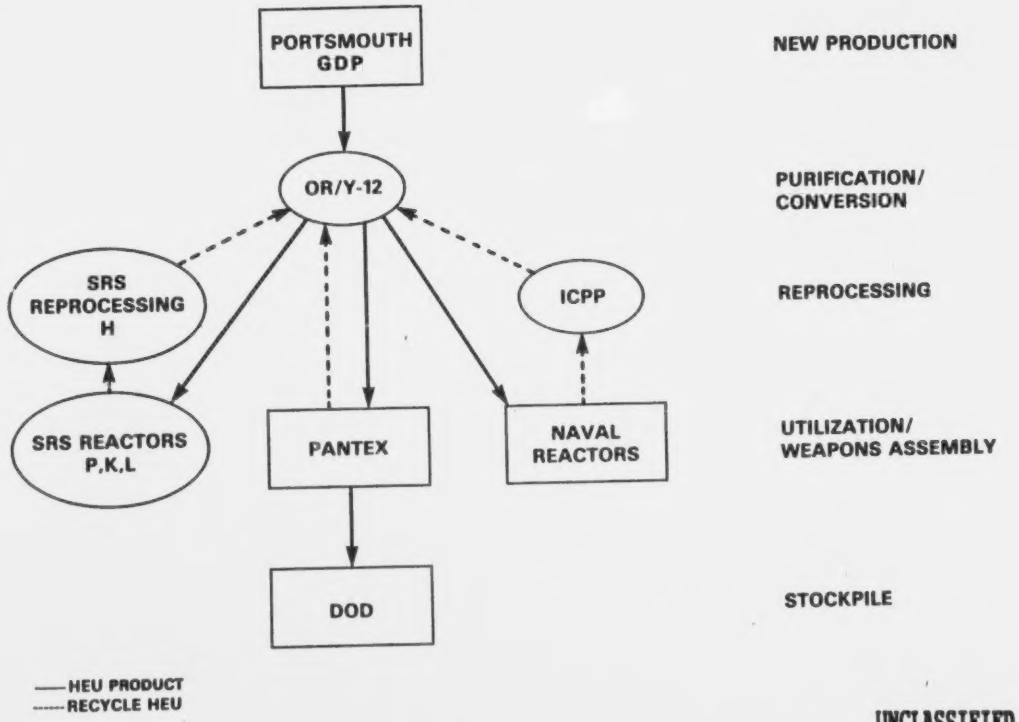
The historical flows which included FMPC and the Oak Ridge facilities have a decreased workload. The Fernald facility has not been in production since last summer. We are expending funds to meet environmental requirements. We are maintaining the production facilities in standby while we concurrently attempt to develop a vendor qualification program because the depleted uranium we used to get from Fernald can be purchased commercially.

As indicated with the green lines, they are both solid and dotted. The dotted lines are intended to show the fact that we do process the scrap, the residue, which contains quantities of plutonium to recover the material. As we do away with the green lines, and we recognize that there is more scrap recovery, this chart shows that we in fact have put a bigger burden on the Rocky Flats Plant to reprocess its own waste. We also are trying to show with this chart that there will be, starting in Fiscal Year 1990, programs to accelerate site returns from Pantex directly to Savannah River to help the recovery of plutonium from returned weapons.

[Slide follows:]

UNCLASSIFIED

ENRICHED URANIUM


PORTSMOUTH GDP
OR/Y-12
SRS REPROCESSING H
ICPP
SRS REACTORS P,K,L
PANTEX
NAVAL REACTORS
DOD
NEW PRODUCTION
PURIFICATION/ CONVERSION
REPROCESSING
UTILIZATION/ WEAPONS ASSEMBLY
STOCKPILE
—— HEU PRODUCT
------ RECYCLE HEU

UNCLASSIFIED

Mr. Starostecki. Enriched uranium is the third and last nuclear material I would like to talk about. The gaseous diffusion plant is the nominal source of our enriched uranium when we need new supplies. For the last few years we have been relying on the existing stockpile. The existing stockpile has been used to supply the highly enriched uranium for naval reactors, for powering the Savannah River reactors, and for providing weapons materials for Pantex.

Although not shown on this chart, there are returns that come from the Department of Defense (DOD) back to Pantex, and the dotted line is intended to show we do recycle the highly enriched uranium as well. It is a dynamic situation. We are not in Fiscal Year 1991 looking for obtaining any enriched uranium from the gaseous diffusion plant, we foresee in the 1991 budget relying on recycled material.

MATERIALS SUPPLY SITUATION

With that as background, I would like to explain where we stand on the tritium supply situation today.

[Slide deleted.]

The zero line on this chart indicates zero in terms of a working inventory at the Savannah River Plant and in the complete. We have [deleted] of tritium in the stockpile, in various phases of the weapons and production stockpile.

The line in blue shows what happens after we meet all the requirements of the DOD and the Nuclear Weapons Stockpile Memorandum and have no restart of a reactor. [Deleted.]

The startup date for the Savannah River reactors that is shown on this chart is not the actual date. We had to pick a date, and we selected October 1 simply to see the situation. This is an information chart to be used in briefing Secretary Watkins this month and next month.

We will be deciding on a firm restart schedule and announcing it in April. What this chart does show is that we do not have a lot of margin and that it is imperative that [illegible] we are to maintain the stockpile and assure new tritium inventory, we have to start up the Savannah River reactors. This chart assumes they would start up, and the first reactor would start up and the second and third reactors would start up at three-month intervals thereafter.

[Slide deleted.]

In terms of the plutonium situation, we have [deleted] of plutonium both in the DOD stockpile and in the DOE system. This chart is intended to show over the years what happens to the plutonium and how we in fact do wind up converting more of the plutonium from scrap and working inventory into materials for the stockpile. This chart clearly indicates that we have a large amount of plutonium.

The difficulty is in the form in which it is located. The top part of the chart shows the amount we have in scrap. The DOE inventory other than scrap backlog means we have various plutonium forms in other than just the specification metal.

[Slide deleted.]

The next slide is intended to show when we look at all those curves, what are we really talking about in terms of specification metal sitting on the shelf that is available to make a new weapon? This curve is not precise because it changes, quite frankly, month to month as the working conditions change at the facilities that process plutonium.

We do in fact process plutonium waste at Richland, Savannah River, and Rocky Flats. As they change in assumption and in their work schedule, this curve shifts a little bit because we are showing how much material is being converted into metal and how much of that metal is being converted into weapons.

What this chart is intended to show is not the absolute number, but that we are converting the scrap to metal and concurrently meeting the demands of the stockpile. I would offer that after 1997, I believe that is really an artificial increase in the specification metal reserve. We really shouldn't show it on the chart because the stockpile numbers that far out have not been firmed up.

Based on that, I would like to show you a snapshot in time of what we mean by weapons grade plutonium inventory.

[Slide deleted.]

This chart shows how much plutonium we have in the entire stockpile and how much we have in the DOE system as of December 31, 1989. On that particular day, we had on the shelf, as I can refer to it, [deleted] available for moving into weapons. This figure does, in fact, fluctuate. We are being very careful in monitoring this situation.

With Rocky Flats being in the condition it is now, this is one of the reasons we are paying this much attention to it, so we make sure we don't go negative.

[Slide deleted.]

Highly enriched uranium is the third special nuclear material. This chart shows that with the available stockpile we have on hand in fiscal year 1991, we project we will be able to meet the demand without any infusion of new materials from the Portsmouth gaseous diffusion plant. Assuming no other further changes, we would be looking for additional purchases in fiscal year 1992.

That completes the charts I want to present. I would simply indicate that we are in a state of transition in the Nuclear Materials program with a number of facilities being put in the position of standby, such as the N reactor.

We have materials at Hanford that we wish to process, but the PUREX facility's mission has been closely tied to the N reactor. They are other facilities at Richland such as the Plutonium Finishing Plant which receive the output from PUREX, and which we need for the next few years to maintain operational.

With that as a brief overview, I would be free to answer any questions at your convenience.

[The prepared statement of Mr. Starostecki appears at the end of the hearing record.]

Mr. Bevill. All right, very good.

Dr. Monetta, the Chair recognizes you at this time.

Dr. **Monetta**. Good morning, Mr. Chairman. This is my first time appearing before you in the role of the Director of the New Production Reactor program.

I took over this program on the 12th of June. What I would like to do is submit my statement for the record and give you a brief summary.

Mr. **Bevill**. Without objection, your prepared statement will be made a part of the record. You may proceed as you wish.

Dr. **Monetta**. Thank you.

[Slide 1.]

This is the mission statement of the program. As you can see, we are primarily focused on the production of tritium, which as you can see from Mr. Starostecki's presentation, is the vital ingredient that we are running out of, and which is in short supply.

[Slide 2.]

The major objectives of the program are such, I would like to call your attention to the second bullet. We are committed to building these reactors in the safest possible manner and to having them operate as safely as any commercial reactors have ever operated.

That is our intent. We will abide by that intention all the way throughout this program.

[Slide 3.]

Just some background on the program to give you a little bit of an idea about where we have been over the last year-and-a-half or so. I will call your attention to the last bullet, which is the record of decision. We are focusing on that particular day and time. That will be where all of the EIS work and all of the technology development will come to bear at a single point. Then we will be able to present to the Secretary a list of alternatives that have been fully costed out and allow him to make a decision on which approach we will take from that point on.

[Slide 4.]

That is our key pivotal date. It is listed in our charts as the 29th of December, 1991. This is just a graph of the events over the ten-year period which will come to be in this kind of time table that will allow us to get on with this program in an expeditious manner. Again, things pivot around the EIS being completed and the record of decision following about 30 days later.

The other events will then fall into line based upon what the Secretary determines to be our course of action.

[Slide 5.]

Our activities for 1990 are varied. We are putting the conceptual design into place rather rapidly. We are going to close on those designs in the June time frame. We will put all of the other components into place this year that will lead to record of decision.

We will culminate the year by having a fully operational field structure in place. The two conceptual design contracts have been put in place and have been proceeding since November. There are two conceptual design contracts for heavy water and one for gas-cooled reactors. They were signed by our operations office in consultation with me on the 1st and 27th of November.

[Slide 6.]

We are in fact ahead of schedule on the conceptual design. We have three design teams in place, two for heavy water reactors, with their various subcontractors, participants and partners and one team for a modular temperature gas cool reactor. These teams are working diligently.

[Slide 7.]

We will close on the conceptual designs for the Heavy Water Reactor in May and then go through a selection process in July—I am sorry.

[Slide 8.]

We will close on the conceptual design for the gas-cooled reactor in May and then go into a down select for the design of a heavy water reactor in July and come out of that competition with one heavy water reactor design team.

We will then move them expeditiously into Title I design in the July time frame. That is when we will commit our construction funding, which is really for the design; the preliminary design.

[Slide 9.]

There will be no turning of ground this Fiscal Year or Fiscal Year 1991. I will draw your attention to the second bullet, which is again the pivotal event, that is the completion of the EIS. This will be done in Fiscal Year 1990 and Fiscal Year 1991.

[Slide 10.]

You can see from this particular chart that we have ramped up rather quickly. We are fully into conceptual design and will be into Title I this summer. Then we will break into Fiscal Year 1991 with more Title I and the remainder of the preliminary work which will give us budget quality information that we will be able to use for our record of decision. That will give us estimates that are within plus or minus 5 percent.

Right now we are working at around 25 or 30 percent regime in our estimates in conceptual design.

[Slide 11.]

Again, this is another way of displaying those numbers. The capital equipment and construction line is rather large. It will be committed beginning around July of this year and all through Fiscal Year 1991. We will come through Title I design with a substantial design for gas cooled and for heavy water reactors.

[Slide 12.]

Then the game gets interesting. Fiscal Year 1992 assumes that we go forward with two reactor designs, and the construction line item increases rather rapidly in anticipation of that. This is after the record of decision, so we are anticipating a determination on the Secretary's part, to proceed with two reactor designs.

However, the budget tables are predicated on going forward with both designs.

[Slide 13.]

Just to summarize the accomplishments over the last year and a half, we have gone through the NEPA scoping hearings which were rather substantive, involving over 8,000 people and over 9,000 comments, most of which were positive and in favor of the reactors. We have anticipated the requirements of nuclear safety and gotten our safety process in place. This is one of the better staffed offices when it comes to nuclear safety in DOE right now.

We are moving expeditiously to engage our safety process in the preliminary design phase of the design teams. We will move out with that process in July on both technologies after we get through the down select on heavy water, which essentially reduces two HWR design teams to one. We will go forward throughout the remainder of this, and next fiscal year with this particular strategy.

Thank you.

[The slides used by Dr. Monetta follows:]

MISSION

TO PROVIDE NEW PRODUCTION REACTOR CAPACITY ON AN URGENT SCHEDULE FOR AN ASSURED SUPPLY OF NUCLEAR MATERIALS, PRIMARILY TRITIUM, TO MAINTAIN THE NATION'S NUCLEAR DETERRENT CAPABILITY.

MAJOR PROGRAM OBJECTIVES

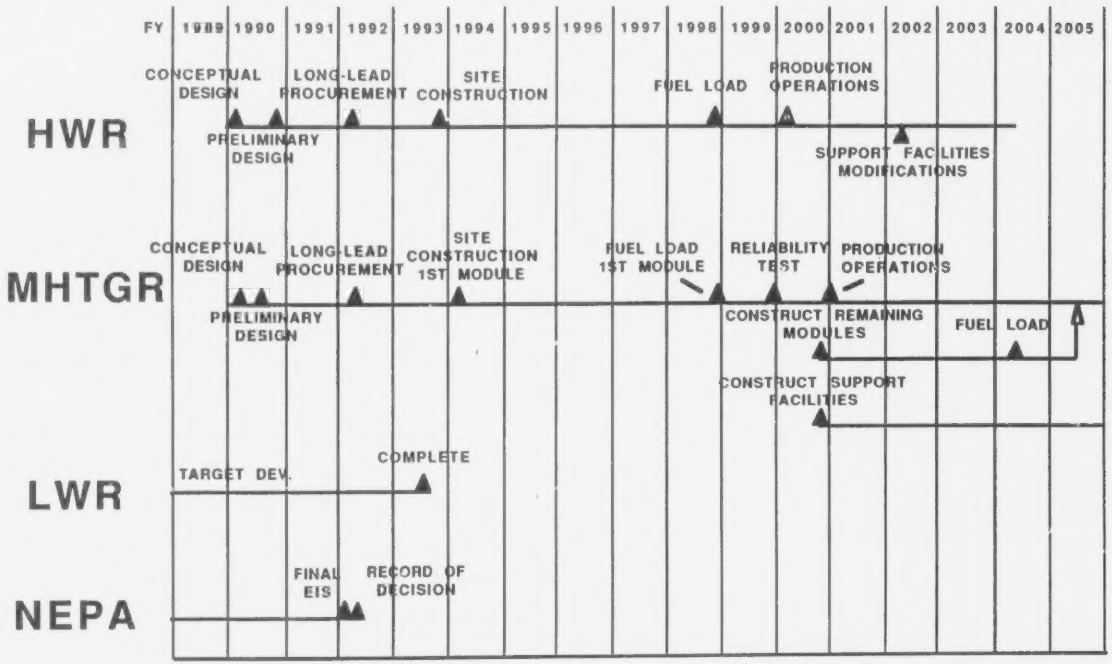
- PROVIDE THE PRODUCTION CAPACITY TO SUPPLY TRITIUM AND OTHER NUCLEAR MATERIALS RELIABLY AND ON A TIMELY SCHEDULE.
- PROVIDE A LEVEL OF SAFETY AND OF SAFETY ASSURANCE THAT MEETS OR EXCEEDS THAT OFFERED TO THE PUBLIC BY MODERN COMMERCIAL NUCLEAR POWER PLANTS.
- MEET OR EXCEED ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS OR STANDARDS FOR ENVIRONMENTAL COMPLIANCE.
- MANAGE THE PROGRAM IN A COST EFFECTIVE MANNER.

PRELIMINARY PROGRAM SCHEDULE AND FUNDING PROJECTIONS

BACKGROUND

- CURRENT SCHEDULES AND COSTS BASED UPON PROPONENT DATA
- PRECISION IS AT PRECONCEPTUAL DESIGN STAGE; NOT BUDGET QUALITY
- DATA ANALYZED, EVALUATED, AND MODIFIED BY DOE AND NATIONAL LABORATORIES
- EXTENSIVE OPERATING SITE INPUT UTILIZED
- CONCEPTUAL DESIGNS TO BE COMPLETED DURING 3rd QUARTER OF FY 1990
- ROD COMPLETED IN LATE 1991

NEW PRODUCTION REACTORS PROGRAM
PRELIMINARY SUMMARY SCHEDULE



ACTIVITIES FOR FY 1990

- COMPLETE CONCEPTUAL DESIGN
- OBTAIN BUDGET QUALITY COST AND SCHEDULE ESTIMATES
- IMPLEMENT PRIORITY ENGINEERING DEVELOPMENT ACTIVITIES
- COMPLETE EVALUATION OF ACCELERATOR TECHNOLOGIES FOR TRITIUM PRODUCTION
- BEGIN SAFETY REVIEWS
- PREPARE FOR DESIGN AND CONSTRUCTION ACTIVITIES:
  - START TITLE I, PRELIMINARY DESIGN
  - REQUEST FOR PROPOSAL FOR CONSTRUCTION MANAGEMENT
- POSITION PROGRAM FOR RECORD OF DECISION IN LATE 1991
- SET UP NP FIELD PROJECT MANAGEMENT OFFICES AT ALL THREE SITES

NPR DESIGN ACQUISITION STATUS

- CONTRACTS WERE AWARDED BY CHICAGO OPERATIONS OFFICE TO:
  - TWO DESIGN TEAMS FOR THE HEAVY WATER REACTOR CONCEPTUAL DESIGN - NOVEMBER 1, 1989
  - ONE DESIGN TEAM FOR MODULAR HIGH TEMPERATURE GAS-COOLED REACTOR CONCEPTUAL DESIGN NOVEMBER 27, 1989
- CHICAGO OPERATIONS OFFICE WILL IMPLEMENT DOWN SELECTION TO ONE HWR DESIGN TEAM FOR TITLE I

HWR CONSORTIA

- EBASCO SERVICES INC. - AE/CONSTRUCTOR/INTEGRATOR
  - BABCOCK & WILCOX - REACTOR DESIGNER AND MANUFACTURER
  - COMBUSTION ENGINEERING - CONTROL ROOM AND SAFETY SYSTEMS DESIGNER
  - ROCKWELL - REFUELING/FUEL HANDLING
  - BATTELLE - AI FUEL SEVERE ACCIDENT ANALYSIS

- NATIONAL PRODUCTION REACTOR GROUP
  - WESTINGHOUSE - REACTOR PLANT DESIGNER
  - BECHTEL - AE/BALANCE OF PLANT AND CONSTRUCTION

MHTGR CONSORTIUM

- CEGA (COMBUSTION ENGINEERING/GENERAL ATOMICS)
  - GA - CORE, TARGETS, FUELS, CIRCULATORS
  - CE - VESSELS, PIPING, COMPONENTS
    - STONE & WEBSTER - NUCLEAR ISLAND (REACTOR STEAM BYPASS)
    - BURNS & ROE - FUEL/TARGET SUPPORT FACILITIES

ACTIVITIES FOR FY 1991

- CONTINUE WITH PRELIMINARY DESIGN (TITLE I)
- ISSUE DRAFT EIS, COMPLETE PUBLIC HEARINGS, RESOLVE PUBLIC COMMENTS AND PREPARE FINAL EIS
- CONTINUE IMPLEMENTATION OF THE SAFETY REVIEWS
- CONTINUE AND PARTIALLY COMPLETE CONFIRMATORY ENGINEERING DEVELOPMENT
- CONDUCT IRRADIATION TESTING AND DIAGNOSTIC EFFORTS TO DEMONSTRATE TRITIUM TARGET PERFORMANCE (MHTGR) AND FEASIBILITY (LWR)

FY 1991 CONGRESSIONAL BUDGET REQUEST
(DOLLARS IN MILLIONS)

LEAD TABLE

	FY 1988	FY 1989	FY 1990	FY 1991
OPERATIONS	$ 10.0	$ 60.0	$200.4	$132.9
CAPITAL EQUIPMENT	0.0	0.0	0.0	8.8
CONSTRUCTION	10.0	0.0	98.5	221.3
TOTALS	$ 20.0	$ 60.0	$298.9	$363.0

FY 1991 CONGRESSIONAL BUDGET REQUEST

(DOLLARS IN MILLIONS)

PROGRAMMATIC ACTIVITIES	FY 1991
OPERATIONS	
CONFIRMATORY DEVELOPMENT	$ 25.8
TRITIUM TARGET DEVELOPMENT	49.7
ENVIRONMENTAL COMPLIANCE	8.3
SAFETY REVIEW PROCESS	16.0
PROGRAM SUPPORT	8.0
PROGRAM DIRECTION	25.1

OPERATIONS TOTAL	$132.9
CAPITAL EQUIPMENT	8.8
CONSTRUCTION	221.3

GRAND TOTAL	$363.0

FY 1991 CONGRESSIONAL BUDGET REQUEST

(DOLLARS IN MILLIONS)

OUTYEAR FUNDING ESTIMATES (B.A.)

	FY 1992	FY 1993	FY 1994	FY 1995
OPERATIONS	$ 106.2	$ 56.0	$ 35.0	$ 149.0
CAPITAL EQPMNT	21.2	25.0	25.0	25.0
CONSTRUCTION	524.1	871.0	1,158.0	1,288.0
TOTAL	$ 651.5	$ 952.0	$1,218.0	$1,462.0

ACCOMPLISHMENTS

- COMPLETED 13 NEPA SCOPING HEARINGS IN 5 STATES
- DRAFTED NPR PROGRAM PLAN
- ESTABLISHED SAFETY REVIEW PROCESS
- PREPARED EIS IMPLEMENTATION PLAN
- PREPARED THE TECHNICAL REQUIREMENTS DOCUMENT
- SELECTED A UTILITY ENGINEERING GROUP TO PROVIDE TECHNICAL EXPERTISE ON NUCLEAR PLANT SAFETY, DESIGN, CONSTRUCTION, START-UP, OPERATIONS, AND MAINTENANCE
- STARTED CONCEPTUAL DESIGN WITH 2 HWR TEAMS AND 1 MHTGR TEAM

[The prepared statement of Dr. Monetta appears at the end of the hearing record.]

Mr. Bevill. Very good.

Next, Mr. John Conway. You may proceed as you wish.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Mr. Conway. Yes, sir. This is the first time that myself and the other members of the board have been before you. If it pleases the committee, I would like to introduce my associates on the board.

Behind me is Dr. A. J. Eggenberger, the vice chairman. John W. Crawford, Jr., a member of the Board. Edson Case and Dr. Herbert Kouts, Carole Council is an executive administrative officer, also with us today.

Mr. Bevill. We are pleased to have each of you with us.

Mr. Conway. We have submitted to you a written statement which with your permission I would ask that it be made a part of the record. We are here to answer any questions that you may have.

Mr. Bevill. It will be made a part of the record.

[The prepared statement of Mr. Conway appears at the end of the hearing record.]

REACTOR RESTART ACTIVITIES

Mr. Bevill. I am going to ask several questions. The one who wants to respond may do so.

Savannah River reactor restart activities include hardware improvements, training and procedures, and human performance and management systems. What are the key issues in each of these areas?

Mr. Starostecki. Mr. Chairman, I would like to answer your question in reverse order. The management systems are obviously of great importance to us.

We have made major improvements with Westinghouse as the new contractor. They have introduced a new senior management team. They have realigned the responsibilities of the reactor plant managers. As for the K Reactor, they have brought in an experienced new person. There is now a reflection of Secretary Watkins' initiative to have clear line management accountability and responsibility down to the individual in the control room of each reactor.

In terms of engineering and safety analysis capability, we have worked with Westinghouse to develop a stronger role for the Savannah River laboratory. Westinghouse has brought to bear their corporate resources in looking at safety analyses.

In the area of training, we have made major improvements in upgrading the training and qualifications of the individual operators. We are working toward a long-term program which will assure that the operators are trained to a comparable level to that which exists in the commercial sector.

In terms of hardware and engineering fixes, we are looking at the condition of the reactors through various ultrasonic inspection devices to insure that the integrity of the piping and the vessels is acceptable.

We are funding major research to assure ourselves that the power levels at which the reactors will be operating are conservative and can be demonstrated so to external peers.

So with a conservative approach, to reactor restart, we have made commitments in each of those areas to focus on the limiting items. We would be happy to add more for the record, if the Chairman wishes, in more detail.

Mr. **Bevill**. Will an EIS be required prior to restart of the Savannah River reactors?

Mr. **Starostecki**. The Secretary has made the decision that we will prepare an EIS prior to restart. We are on track, Mr. Chairman, to issue a draft of that document here in the next few weeks. We would hope this summer to have a final Environmental Impact Statement and a Record of Decision. However, that does depend on the nature and extent of comments we get on the draft.

Mr. **Bevill**. What major technical issues need to be resolved prior to final decision and construction of the NPR's?

NPR TECHNICAL ISSUES

Dr. **Monetta**. The New Production Reactors have essentially three options open right now. The Heavy Water Reactor, the Modular High Temperature Gas-Cooled Reactor, and the Light Water Reactor tritium target work being done.

The technical questions revolve around different issues for different reactors. The Heavy Water Reactor involves a question of confirming all the new safety measures that we are anticipating introducing into the designs of heavy water reactor, such as, the upflow cooling system and those kinds of issues that are essentially of confirmatory development in nature.

The Light Water Reactor tritium target work is a question of whether or not we can successfully demonstrate the design of the target that is being anticipated for that light water reactor. We are doing work in the advanced test reactor at Idaho Falls to demonstrate that the target will in fact capture the tritium in quantities that we believe that the lithium target material will generate, hold and retain.

The gas-cooled reactor essentially is a question of whether or not we can build an adequate target for that reactor; whether or not we can fabricate the fuel and target components and then recover the tritium out of the target. So, that is the type of work we are doing this year.

ENVIRONMENTAL IMPACT STATEMENT

Mr. **Bevill**. The program is proceeding with preparation of an EIS concurrent with design activities. What are the potential disadvantages of this strategy?

Dr. **Monetta**. There really aren't any major disadvantages with that particular strategy. We are moving concurrently with those issues. We are well coordinated in the various functions, the EIS function and the engineering function are all within the New Production Reactor program organization. We have a great deal of coordination going on, are well knit together and believe that we will be able to not only write the EIS in a timely way, but also be able to defend it successfully. As always, that defense is the open question. We are writing the EIS in such a way so that we can take it and defend it successfully well through any litigation process.

The downside is that there could be litigation and this will always be the potential downside.

Mr. **Bevill**. In the current political climate, why is it necessary to maintain a two technology, two site strategy for New Production Reactors?

Dr. **Monetta**. The duality strategy is essentially a strategy of assurance. It is a strategy that was conceived, because of a need to guarantee that we will always have a production capability that will be able to produce sufficient quantities of tritium for the strategic weapons program.

That is why the duality strategy is designed in the New Production Reactor effort to contain two different technologies at two sites with two different reactors, so that the probability of one particular technology or one site or one natural or man-made terrorist event threatening that production capability would be almost zero because of the completely dual paths that would be present in this system.

Every time we have a situation where we don't have a dual path, we have some real serious issues as to whether or not we can assure the proper levels of materials coming into the weapons program.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Mr. **Bevill**. The legislation establishing the Defense Nuclear Facilities Safety Board directed the Board to review and evaluate the design, construction, operation and decommissioning of defense nuclear facilities of the Department of Energy. Could you share with the committee your thoughts on how you would implement this as well as your priorities?

Mr. **Conway**. Yes, sir. In the statute that mandates what we do, standards include regulations and orders. It is quite a significant amount of work that is involved. It includes not only standards issued out of the DOE headquarters, but it also includes at each separate facility. Now, that is a job that is going to take an extremely long period of time if we are to do it adequately.

Therefore, we decided to set up a priority. We set up priority on the basis of what DOE has indicated to us is the priority of the DOE. Number one priority are the Savannah River reactors, also Rocky Flats is number two. Both are top priorities that we are giving special attention to.

I have submitted with my statement the background resumes of the individual members of the Board. If you have an opportunity to review them, you will see that each and every member of the Board has, brings with him quite a background in the nuclear field, particularly in the area of safety.

We have been able to move quite quickly in doing substantive work because of our individual backgrounds and also because we have set priorities. We have visited Savannah River, we have visited Rocky Flats. We have also some other priorities, but not quite as high as those two. We also have visited the WIPP project. There has been some indication in the minds of some that there may be a safety problem at Hanford. We have been looking into that on an order of priority

In response to your question, what I would say to you is we believe we are being selective first off in prioritizing these areas that we are looking into at the beginning. I hope that is responsive to your questions.

Mr. **Bevill**. This Board is, in effect, the NRC?

Mr. **Conway**. Not quite, sir. I think we are—obviously, we are an independent——

Mr. **Bevill**. I don't mean to offend the Board.

Mr. **Conway**. We are an independent agency, establishment, I guess I would say, an independent establishment. We are not part of DOE. We do not have regulatory responsibility. We cannot order by law the DOE to do something. We cannot license them to operate or to hold back a license. To that extent, we are different from the NRC.

Mr. **Bevill**. I can see that I touched a nerve when I asked the question.

The Chair recognizes Mrs. Boggs.

NPR COST PROJECTIONS

Mrs. **Boggs**. Thank you, Mr. Chairman.

I was pleased to hear the explanation of why we have two separate technologies in which we are investing. I know that you have spelled out why this was necessary. In the major program objectives, you go on to say, you seek to manage the program in a cost effective manner. I just wondered what the total estimated cost of the two technologies is and are there any other viable alternatives?

Dr. **Monetta**. We have cost projections that originate with the proponents. They are several years old. One of the objectives of getting through conceptual design and into Title I, which is preliminary design, is to get budget quality cost data. Right now the total estimated cost of the program in 1988 dollars is estimated to be $7.0 billion. That will be adjusted some time within the next year as we go through preliminary design.

Mrs. **Boggs**. Are there any other viable alternatives?

Dr. **Monetta**. Viable? I am sorry. I don't understand.

Mrs. **Boggs**. In technologies.

Dr. **Monetta**. There are, we believe, no other viable alternatives, but the three technologies that we are in fact analyzing. Heavy Water Reactor, Modular High Temperature Gas-cooled Reactor, and Light Water Reactor. There were two other technologies that were considered, the accelerator and the liquid metal reactor. They were excluded last year from consideration in the EIS because they were considered to be immature in their technology base and would require a significant amount of development to bring them into a regime where we could in fact utilize them on an urgent basis; essentially having an operational capability within the next 10 years.

Mrs. **Boggs**. What is the difference between the technologies that you have decided upon?

Dr. **Monetta.** The three technologies include the Heavy Water Reactor, which is the technology that we have been operating at the Savannah River site for the last 37 years. It is a standard heavy water reactor design, the one that we are anticipating will incorporate all of the work we have done at Savannah River over the last 37 years in that technology and bring into the design all of the safety experiences that we have from commercial reactors.

The Modular High Temperature Gas-cooled Reactor technology is the reactor design that has been put forward by the General Atomics/Combustion Engineering team. It is a reactor design that shows some very innovative safety features. These are the kinds of features that we want to incorporate because they give us a reactor with a higher safety margin. It separates out the fuel in a much different way than a heavy water reactor or light water reactor does.

The light water reactor option which embodies the WNP-1 reactor at Hanford, presently about 63 percent complete, is a traditional, commercial light water reactor. There are close to 109 of them operating in the United States and 321 around the world.

That is a very familiar known technology. The WNP-1 reactor is in place. There has been quite an investment put into it. Our thought is to try and develop a target that would fit into that reactor, if possible.

HANFORD CONCERNS

Mrs. **Boggs.** Thank you very much.

Speaking about Hanford, I notice that you, Mr. Conway, said the Board had gone to review some of the problems that were there. In one of the charts I noticed that at Hanford, environmental upgrades to handle the fluid streams from the plant, including the 242-A evaporator, will be performed. Would you expand on that a little bit?

Mr. **Starostecki.** I think I can explain that from the Department of Energy standpoint. As part of operating the PUREX facility, we have [deleted] various forms of plutonium in N reactor fuel sitting in storage basins. If we are to process that material, we need to be able to comply with all the environmental laws. In fact, processing it would appear to improve the safety posture of the site.

Historically, when PUREX was operated, liquid discharges were diverted to the ground. Because these liquid discharges include chemicals like hexane, current environmental regulations require the liquid to be stored for treatment. Thus, we are planning to add a liquid effluent retention facility and eliminate any discharge.

We are looking at an additional four to six years of operation of PUREX to stabilize the fuel that is already sitting in storage basins.

Mrs. **Boggs.** Thank you so much.

Thank you, Mr. Chairman.

Mr. **Conway.** The matter at Hanford per se is not one of the top priorities for the Board based on material that the department has made available to us. However, during hearings before the Senate Armed Service Committee considering our nominations, one of the Senators made available to us a report that indicated, according to his interpretation of the report, that there was a possibility of chemical explosion at some of the high level waste tanks. We put that as one of our priorities to look into, and we have been looking into that.

Mrs. **Boggs**. Have you reached any conclusions?

Mr. **Conway**. We have not as a Board reached a conclusion yet, but we are very close to making some recommendations within the next week or so.

Mrs. **Boggs**. Thank you.

Thank you, Mr. Chairman.

DEPARTMENTAL OVERSIGHT

Mr. **Bevill**. John, the department's operations are currently being reviewed by numerous other internal and external oversight groups and "tiger teams." How would your Board coordinate with these already established groups to prevent disruptive and unnecessary duplication of effort?

Mr. **Conway**. We are very sensitive to that. In fact, on one occasion when we were prepared to visit Rocky Flats, we determined that there was an advanced tiger team visiting at the site at the time. We decided we would not go there at the time because we didn't want to be involved in anything that might be distractive to the tiger team.

Let me say this. The tiger teams and the other advisory committees are organizations set up by the Secretary himself. He decides when and how he wishes advice from various groups and determines when and where they will go to give him advice. We are, as I say, an independent establishment. We have been set up by the Congress. We are mandated to do certain things. Therefore, we look to the enabling legislation that sets our organization in being, and we look to that for what we will do. To the extent that there are other committees, other advisory groups, that is a determination, that is at the discretion of the Secretary himself.

I won't attempt to tell him how to get his advisory groups or how many he should have. There is no question in my mind and the minds of the Board members that we have a separate responsibility that is mandated by law.

We will do the job that we have to do as we are constituted.

Mr. **Tuck**. Mr. Chairman, if you permit?

Mr. **Bevill**. Yes, Mr. Tuck.

Mr. **Tuck**. Mr. Conway and the committee has been very forthcoming in not operating totally independent of the Department of Energy activity and whatever oversight that is going on internally at the direction of Admiral Watkins. He coordinates for the Defense Nuclear Facilities Safety Board. The activities of the Nuclear Facilities Safety Board, is not a formal arrangement, but a very closely coordinated operation with what we call our Office of Nuclear Safety. The head of the Office of Nuclear Safety and the Defense Nuclear Facilities Safety Board takes into consideration those actions that are already ongoing in the Department in the coordination of their activities.

Mr. **Conway**. Mr. Chairman, if I may add?

Mr. **Bevill**. Yes.

Mr. **Conway**. We have found the Secretary and his panel have been most cooperative with us. They have been very forthcoming in furnishing us information as we requested it. The tiger teams—when they make a report—the results of their investigations and their reports have been made available to us as well as the reports of the Ahearne Committee. Their data has been made available to us. I think we have a very, very good working relationship.

Mr. **Bevill**. The name "tiger teams", is it as aggressive as it indicates?

Mr. **Conway**. I would have to turn to Mr. Tuck to respond to that.

Mr. **Tuck**. We think so.

Mr. **Bevill**. The Chair recognizes Mr. Fazio.

CIVILIAN AND NPR R&D PROGRAMS

Mr. **Fazio**. Thank you, Mr. Chairman. I am sorry I didn't get here earlier to hear all of the comments. I am sure I can get caught up with the staff here. I wanted to ask questions about the New Production Reactor program. It is my understanding that DOE is carefully managing the New Production Reactor for the modular high temperature gas-cooled reactor program in coordination with a similar civilian program so that the two are complementary and not duplicative. Can you outline for us how the two programs are coordinated and indicate which elements of the research and development fall under the NPR program as opposed to the civilian program?

Dr. **Monetta**. I would be happy to. I have signed a memorandum of understanding between myself and Bill Young, who is the Assistant Secretary for Nuclear Energy. That MOU essentially spells out in reasonable detail the jurisdiction of each program. Just to summarize those jurisdictions, we have agreed that the Nuclear Energy program would cover all of those elements that are particular to commercial reactor technology. The New Production Reactor program would cover the technical elements that are common to both technologies and to both requirements of the commercial and production reactor.

We have also set in motion a committee that meets on a monthly basis and that looks at all the tasks being generated in both of those efforts to make sure that the tasks as they are being generated and as they are being executed by various contractor and national labs around the country are being done in such a way that there is no overlap or duplication of effort. This coordination that the tasks dovetail to each other, so that there is a smooth continuum of capability that is emerging out of both efforts.

NPR GOAL QUANTITIES

Mr. **Fazio**. According to the GAO report which came out last September, the total life cycle cost of DOE's current two reactor NPR strategy is nearing $40 million. In general, the cost of the smaller fraction of goal production NPR is quite close to that of 100 percent of goal production NPR because most of the costs are in development which is independent of the size of the final reactor.

For the MHTGR NPR, however, the total life cycle costs of 100 percent of goal are actually less than those for 50 percent of goal because the greater revenue from steam or electricity sales more than offset the greater construction costs. If you accept those economics, does it make sense for DOE to plan for 100 percent of goal MHTGR rather than a 50 percent goal?

Dr. Monetta. The whole issue of goal quantities is, needless to say, a very complex issue that involves estimating how much tritium is going to be required in the year 2010 and beyond. Right now we are attempting to get our arms around those kinds of numbers in order to give us a better frame of reference for the preliminary design as it goes forward. We are presently designing to a requirement of [deleted.]

That quantity of tritium is to be made up by building a full scale Heavy Water Reactor as a preferred technology if and when that design emerges from the record of decision.

That particular size is convenient because it is similar to the reactors that are presently at the Savannah River site so the general designs of the three reactors that are in place and operational can be incorporated into that new Heavy Water Reactor design to maximize the assurance that we will be able to utilize the 37 years of safety record that Dupont and now Westinghouse Savannah River have been able to build into that particular technology.

The Modular High Temperature Gas-cooled Reactor has been designed deliberately in modules. Those modules will in fact represent [deleted.] We are presently planning to build four modules.

Those four modules represent a hypothetical 50 percent of goal quantity. We have tended to move away from that kind of statement over the last several months because I think it is misleading. We would like to think of the Modular High Temperature Gas-cooled Reactor as one where we can add modules to bringing up total production capability of that machine if and when we will need it.

Mr. Fazio. Based on policy changes?

Mr. Monetta. That is correct, sir.

NPR DESIGN AND PRODUCTION SCHEDULES

Mr. Fazio. Could you compare as you go along here the design and construction schedules for the two approaches, the heavy water reactor and the high temperature gas-cooled reactor? It is my understanding both reactors could be in full production within a 10 to 12 year timeframe. Is that correct in your opinion?

Dr. Monetta. That is correct. As we built upon the last two years worth of ERAB and other studies, we have been able to conclude that we could have an operational Heavy Water Reactor in about 10 years, about 1999 or 2000. We originally saw the Modular High Temperature Gas-cooled Reactor on like a 15-year time table. I presently have requested the design team to look at the feasibility of compressing that time table to bring it into the 10 to 12 year regime, and to bring it more potentially on a par with the Heavy Water Reactor schedule.

Mr. Fazio. You are saying design and construction schedules could be essentially the same?

Dr. MONETTA. They could be essentially the same, yes, sir. What we are doing now is we are trying to get the design teams to validate those contentions and to show us how and where we would have to compress certain schedules to make that happen.

Mr. FAZIO. Could you tell us the amount of R&D work that is necessary for both technologies? I understand that they both require about equal amounts of R&D work. Is that your opinion?

Dr. MONETTA. Yes, the R&D work is different for each of the machines, the Heavy Water Reactor requires a fairly substantial amount of confirmatory development. That is, development work that is going on with the new safety features that we anticipate incorporating into those designs. That work tends to go on more than not in the national laboratories. It goes on most frequently in materials development work in the Modular High Temperature Gas-cooled Reactor. This work tends to go on with the target which is being developed for that particular machine, and in the fuel and target fabrication technology. We will have a fuel system and a target system that is capable of being manufactured in a high quality way complying with all of our requirements for quality control. There are approximately the same amounts of money going with each but they tend to be focused in different spots because of questions about certain things that are unknown and that we need verification on.

Mr. FAZIO. The sum total of both efforts is about the same?

Dr. MONETTA. About the same.

Mr. FAZIO. Even though they are emphasizing different problems?

Dr. MONETTA. In dollars they tend to be the same.

Mr. FAZIO. If we look ahead to the time when you have a record of decision under the National Environmental Policy Act, at the completion of that, when it is reviewed by DOE and Congress, aren't we in a position to essentially give equal priority in new production reactor planning and in research and development to both the heavy water approach and to the high temperature gas-cooled reactor module type approach?

Dr. MONETTA. We are attempting to bring all of the technology options to fruition for a record of decision, so that the Secretary will be presented at that point in time with a completely authenticated Heavy Water Reactor design and a design for a Modular High Temperature Gas-cooled Reactor and its target and fuel fabrication facilities along with a target for the light water reactor. Our intention is to bring all of those technology questions to some degree of closure and to get costing specification within plus or minus 10 or 15 percent by the record of decision.

Mr. FAZIO. So that the Congress and the administration at DOE will be in a position to make a fair and equitable evaluation of two competing technologies at that point?

Dr. MONETTA. That is correct, with the overlay of the Environmental Impact Statement on top of that. All of that should come to bear at record of decision time.

Mr. FAZIO. Is there any concern on your part that there would not be sufficient support in either the executive or legislative branch for a new production reactor, in your view? Is that a question for debate in light of changing world conditions or is this something that is fundamental to have the potential of a deterrent at any point?

Dr. **Monetta**. I have not seen any questions about the requirement for this program.

Mr. **Fazio**. From even your most typical critics?

Dr. **Monetta**. From even my most typical critics.

BENEFITS OF THE MHTGR

Mr. **Fazio**. Could you just briefly, and I will conclude with this, indicate from your perspective what major benefits the modular high temperature gas-cooled reactor technology could be to the NPR program?

Dr. **Monetta**. That particular technology is one that offers a new way of capturing the fuel in such a way that it produces an intrinsically safe design that gives us a much better assurance that we will in fact over the next 50 years of operation have an inherently safe reactor that will stand the test of all of the challenges that will be brought to various reactor technologies in this country.

We are insuring the safety of that design by requiring a containment vessel around it and to further develop the design in such a way that it will be as safe as any commercial reactor we have in operation today.

Mr. **Frazio**. Will this be the first production reactor with a containment feature?

Dr. **Monetta**. This will be the first Modular High Temperature Gas-cooled Reactor with a containment vessel.

Mr. **Fazio**. We retrofitted some of our production reactors? I thought one of the concerns that people had at Chernobyl was that we didn't have a containment vessel on our production reactors.

Dr. **Monetta**. There are no containments on the present production reactors at Savannah River.

Mr. **Fazio**. We are going not only for an inherently safe system, but we are going to put a containment vessel on top of that.

Dr. **Monetta**. Both New Production Reactors will have containment vessels on them at both sites.

Mr. **Fazio**. For public acceptance, and let's be honest, these days that may be one of the major questions, we have seen the reaction to our program in the western states where it had its most popular acceptance historically. Do you believe this offers the kind of assurances that will make it easier to actually site this reactor?

Dr. **Monetta**. I do. I think that public perception is something that is very important. We planned this program to be a fully operational reactor all the way out to 2040. As we can see from what is happening with public perception and outcry in this country, it is becoming a very significant component.

Mr. **Fazio**. Thank you, Dr. Monetta. I appreciate your comments.

Mr. **Bevill**. Any other questions?

I think each of you for your fine presentations. This committee will stand adjourned until 10:00 a.m. tomorrow.

[The statements of Mr. Starostecki, Dr. Monetta and Mr. Conway and questions and answers, provided for the record follow:]

Nuclear Materials Production
FY 1991 Budget Request
March 13, 1990

REACTOR RESTART

Mr. Bevill. What is the current schedule for restart of the Savannah River reactors?

Mr. Tuck. Secretary of Energy James D. Watkins received a comprehensive briefing on March 13, 1990 by senior managers of Westinghouse on the current status of the Savannah River reactor restart effort. The briefing included a substantial discussion of key improvements made to date in reactor systems as well as enhancements to personnel training and the improved controls being put in place to assure that the reactors can be safely started and operated. Since Westinghouse's last comprehensive briefing to Admiral Watkins last year, a number of tasks have been added to the scope of the restart effort by DOE and Westinghouse to further enhance the safe operations of the reactors. The projected restart schedule presented by Westinghouse, including these additions, does not significantly impact the earlier announced schedule for power operations of the first reactor in the fourth quarter of calendar year 1990.

Mr. Bevill. What assurance can you give that the Savannah River reactors will be safe when they operate? What types of reviews must be conducted, and by whom, before restart.

Mr. Tuck. The Department will not restart these reactors until we are convinced they are safe to operate. Prior to the restart of the SRS reactors, DOE will prepare a Safety Evaluation Report and conduct an Operational

Readiness Review. The newly formed Defense Nuclear Facilities Safety Board is reviewing restart activities and their recommendations will be addressed prior to restarting any of the SRS reactors. Additionally, DOE will prepare an Environmental Impact Statement evaluating the environmental impact of continued operation of the reactors prior to any decision to restart the reactors.

Mr. Bevill. What power levels do you expect them to operate at?

Mr. Tuck. Initially, the reactors are expected to operate at approximately 50 percent of previous full power.

Mr. Bevill. What analyses are underway or completed which would indicate what power levels might be appropriate at the SRP reactors?

Mr. Tuck. A series of experiments have been conducted to provide a better understanding of the heat removal capacity of the reactor fuel assemblies under the low coolant flow conditions that would exist under accident conditions. The experimental results provide benchmarks for the computer codes which are used to calculate the power limits. The preliminary results from recently completed experimental and analytical work indicate that, as currently configured and considering our current analytical capabilities, the reactors can safely be operated at approximately 50 percent of the average historic full power level. For the longer term, there are further efforts underway that might permit safe operation of the reactors at higher power levels. These efforts include potential modifications to reactor systems and improvements in our ability to analyze the behavior of the reactors under accident conditions.

Mr. Bevill. Is it expected that power levels will be able to be increased in the future pending more confirming analyses?

Mr. Tuck. Yes, efforts are underway to allow operation of the Savannah River Reactors at higher power levels. Future increases in power are expected to result from two principal areas. One area presently under study is the possibility of making system modifications which would improve the performance of the reactors under accident conditions. Power increases might also be realized through an improved ability to predict accident conditions as a result of analytical and experimental programs currently in progress.

TRITIUM PRODUCTION

Mr. Bevill. Will tritium production goals be achieved at these levels?

Mr. Tuck. If the Savannah River-Site reactors are restarted on the currently planned schedule and at 50 percent of previous full power they will produce sufficient tritium to meet requirements.

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Mr. Bevill. At what point in time does lack of tritium production become critical? What contingency plans are there if the reactors do not start by that date?

Mr. Tuck. As mentioned earlier, without new tritium production, we would expect to impact deliveries to the Department of Defense

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REACTOR UPGRADES

Mr. Bevill. What is the nature of the upgrades that are being undertaken at the Savannah River reactors?

Mr. Tuck. The Department has a broad array of activities to assure the safe and reliable operation of the Savannah River production reactors until new production reactor capacity becomes operational in the late 1990's. The most important short term upgrades fall into four major categories--provide reasonable assurance, through interim measures, that safety structures, systems, and components are capable of carrying out their mission; assure there is adequate technical and administrative control of the reactor plant; enhance Department of Energy technical vigilance and monitoring of restart operations; and improve human performance through improved training and by providing additional on shift technical support.

Accomplishment of the short term objectives will allow safe restart of the production reactors. Proposed long term improvements include but are not limited to fire protection upgrades, enhancement to the confinement system, and improved seismic bracing of critical systems. The long-term objectives through the Reactor Safety Improvement Program will ensure that safety and reliability improves on a continuing basis.

Mr. Bevill. Savannah River reactor restart activities include hardware improvements, training and procedures, and human performance and management systems. What are the key issues in each of these areas?

Mr. Tuck. In the hardware area, the major thrust of the modifications is focused on upgrading the seismic and fire protection capabilities of the reactors. Examples of major modifications to upgrade the seismic capability of the reactors are: installation of new seismically qualified diesel generators and addition of independent, automatic seismic shutdown instrumentation to the supplementary safety system. Fire protection upgrades include the installation of fire detection equipment in critical buildings and the installation of additional water supply systems inside the protected area of each reactor. In the training and procedures area, enhanced safety of reactor operation will result from improved training of the operations staff and by improving procedures for both normal as well as off-normal operations. A fifth operating shift has been added to accommodate the enhanced training program. The pre-restart procedures development effort involves the preparation or modification of approximately 1,200 operating and emergency procedures. In the human performance and management systems area, the focus is on introduction and employment of proven practices utilized in the commercial nuclear power industry. Some examples of such activities are: increased discipline in the conduct of operations; increased formality of work control management; improved management of quality assurance; and the upgrading of the Technical Specifications for the SRS reactors.

Mr. Bevill. Will an EIS be required prior to restart of the Savannah River reactors?

Mr. Tuck. The Department intends to complete an Environmental Impact Statement evaluating the environmental impacts of the continued operation of the Savannah River reactors and to issue a Record of Decision prior to any decision to restart the reactors.

Mr. Bevill. Please provide a detailed breakout of activities associated with reactor operations for the Savannah River reactors. Provide the funding associated with each activity by year from FY 1987 through FY 1991.

Mr. Tuck. I will provide the information for the record. (The information follows:)

OFFICE OF NUCLEAR MATERIALS PRODUCTION
REACTOR OPERATIONS FUNDING AT SAVANNAH RIVER
(DOLLARS IN MILLIONS)

	FY 1987	FY 1988	FY 1989	FY 1990 a/	FY 1991
Fabrication					
Raw Materials	$ 50	$ 50	$ 54	$ 61	$ 67
Environmental, Safety and Health and Quality Assurance	7	7	7	6	6
DOE Direct Costs					
Wackenhut Services (S&S)	4	4	4	4	4
Support Services	0	0	4	5	4
Total Fabrication	$ 61	$ 61	$ 69	$ 76	$ 81
Irradiation					
DOE Direct Costs					
Du Pont Transition Costs	$ 0	$ 0	$ 10	$ 0	$ 0
Wackenhut Services (S&S)	14	14	14	18	20
Support Services	5	5	9	6	11
Reactor Operations Management Plan					
Reactor Operations/Restart Div.	87	82	144	273	311
Environmental, Safety and Health and Quality Assurance	19	19	21	28	37
Engineering and Project Support	23	27	66	83	124
SR Laboratory Support	47	41	73	91	99
Site Support	25	25	25	32	50
Total Irradiation	$ 220	$ 213	$ 362	$ 531	$ 652
Total Reactor Operations	$ 281	$ 274	$ 431	$ 607	$ 733

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a/ Reflects proposed reprogramming of $167 million including DOD transfer of $135 million.

TRITIUM COMMERCIAL SALES

Mr. Bevill. Is the Department continuing to sell tritium to other countries and commercial enterprises? What impact are these sales having on our tritium shortfall?

Mr. Tuck. Tritium sold to domestic and foreign users by DOE has a small impact on the tritium shortfall because the quantities sold are small compared to weapons requirements. Over the last 5 years, tritium sales have averaged about 165 grams per year whereas weapons requirements have been at a multi-kilogram level.

Mr. Bevill. Why is the Department continuing this practice?

Mr. Tuck. The Department has continued to sell tritium because of its important use in biomedical research, medical diagnostics, and self-luminous applications, such as those for the Department of Defense.

TRITIUM PRODUCTION

Mr. Bevill. What is the cost of producing a gram of tritium?

Mr. Tuck. The projected total cost for tritium is *Deleted* gram; and the projected incremental cost for new tritium is *Deleted* gram expressed in current-year, FY 1990 dollars. These costs are based on production in the Savannah River Site reactors and assume that the SRS reactors are ultimately restored to nearly-full or 95 percent power through technical improvements. If the SRS reactors are unable to achieve power levels significantly above 50 percent, the cost for tritium would be double.

It should be noted, however, that the cost the Department charges its commercial customers is based on average historical costs, not on either total or incremental costs.

Mr. Bevill. What has been the price per gram for material sold to customers the last ten years?

Mr. Tuck. DOE prices have risen from $0.80 per curie in 1980 to the current price of $2.90 per curie. A detailed price history will be provided in a table for the record. (The information follows:)

Fiscal Year	Average $/Curie	Average $/Gram
1990	2.90	27,956
1989	2.90	27,956
1988	1.26	12,146
1987	1.10	10,604
1986	1.10	10,604
1985	1.12	10,797
1984	1.10	10,604
1983	1.07	10,315
1982	0.95	9,158
1981	0.80	7,712

Mr. Bevill. Under what conditions would the Department suspend sales?

Mr. Tuck. DOE probably would suspend sales of tritium if it is determined that there will be no improvement in the supply within a reasonable period of time. DOE did suspend sales in 1989, for several months, to correct a problem in handling and measuring tritium at the Oak Ridge National Laboratory, the site from which sales have occurred.

SAVANNAH RIVER SAFETY

Mr. Bevill. Please characterize the attitude towards safety at the Savannah River plant. Have attitudes toward safety changed in the past year?

Mr. Tuck. I believe that the problems at Savannah River stem in part from the fact that the site was isolated from the commercial nuclear power industry. We have taken several steps to create a special safety culture at the Savannah River Site. Some of the key elements of our strategy for improving the safety culture are: an infusion of personnel with commercial nuclear power and Navy nuclear power experience, significantly upgraded training programs, increased contractor self assessment, and increased technical vigilance by DOE personnel. Effecting such a culture change at a site such as Savannah River which has been in operation for many years and which had deeply rooted practices will take time but we have already seen significant improvement in many areas. I believe that with continued dedicated effort, leadership, and training we will be successful in establishing and institutionalizing a top notch safety culture.

Mr. Bevill. Please describe the changes in how the Savannah River reactors are planned to be staffed and operated in the future.

Mr. Tuck. Reactor staffing will be both increased in number and better trained. Each reactor will have crews to permit a five-shift rotation, compared to four shifts in the past. The extra shift allows additional time for training. Another important change will be the addition of support personnel who will perform work planning and scheduling tasks that are presently performed by operating personnel. This change will allow the reactor operators to concentrate on their primary duty of operating the reactor efficiently and safely.

Mr. Bevill. Will there be any increases in reactor operator training?

Mr. Tuck. Yes. Operators will receive at least 12 cycles, 40 hours each, of training prior to restart of the reactors and will continue to receive additional training on a regular basis. The training will include practice sessions on the reactor simulator.

REACTOR TRAINING INITIATIVES

Mr. Bevill. Please characterize any new training initiatives. Compare this training to that received by operators in commercial reactors.

Mr. Tuck. DOE's training requirements endorse the same standard as the commercial nuclear industry uses, ANS 3.1, "Selection, Qualification, and Training of Personnel for Nuclear Power Plant". Major specific improvements to the training programs are underway at the Savannah River Plant. The improvements to the reactor operator training programs include implementation of a five-shift rotation for reactor operators to provide more time for training requalification, upgrades in the training subject matter content, required training after changes in procedures and hardware have been made, assignment of training advisors experienced in current industry training practices and standards, assignment of a degreed, certified supervisor as a Shift Technical Engineer, increased training in fundamentals and plant systems, and periodic evaluations of knowledge and performance of the operating crews.

As a longer term program, a significant Departmental training initiative, which will apply to the Savannah River Plant, is the establishment of the program for accreditation of performance based training for DOE nuclear facilities. This program includes reactor operators and is modeled after the training provided to commercial reactor operators.

Mr. Bevill. How much is being spent on reactor operator training?

Mr. Tuck. We estimate that funding for reactor operator training was $16 million in FY 1989, and will be $18 million in FY 1990 and $18 million in FY 1991.

Mr. Bevill. Which organizational element is responsible for funding and developing such training?

Mr. Tuck. The Office of Defense Programs, through the Savannah River Operations Office, is responsible for funding the reactor operator training programs implemented by the Savannah River Site operating contractor. The operating contractor is responsible for developing these training programs based on requirements and guidance provided by DOE Headquarters and using the experience base and expertise available from the commercial nuclear industry.

Mr. Bevill. Please describe the status of the Pu-238 mission at Savannah River. What is the total cost of the Pu-238 program by year? How is the funding split by program and appropriation account?

Mr. Tuck. The current inventory of Pu-238 will be blended at the Savannah River Site to meet near-term user requirements. For the long-term, the Department has concluded that Savannah River is the only site capable of producing new Pu-238 in time to meet the needs of current firm missions. Some of the Savannah River facilities are needed immediately for Pu-238 scrap recovery and blending and to process and supply Neptunium-237 for new Pu-238 production. The other facilities at Savannah River require refurbishment in order to play a part in the production of new Pu-238. A total of $12.2 million is needed this fiscal year for processing of the existing Pu-238 inventory and for pre-production tasks. The Department is examining ways to reprogram in FY 1990 funds from other Departmental activities to the Nuclear Energy program, under the Energy Supply Research and Development appropriation, to allow us to proceed with this work. The costs associated with Pu-238 production at Savannah River total $162.9 million through FY 1995. I will provide a breakdown by program for the record based on previous funding history. However, the Department is still reviewing funding options, including NASA reimbursement schedules, and this breakdown may change.

Pu-238 Production at Savannah River
($ in Millions)

	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	TOTAL
Atomic Energy Defense Activities, Defense Programs	10.5	13.0	13.2	13.2	13.2	13.2	76.3
Energy and Water Development, Nuclear Energy	13.3	18.0	10.7	14.2	14.8	15.6	86.6
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	23.8	31.0	23.9	27.4	28.0	28.8	162.9

Mr. Bevill. What is the status of the severance pay issue with DuPont for Savannah River Site employees?

Mr. Tuck. DuPont filed suit in United States Claims Court against the Department of Energy in June 1989. The case is now in the discovery phase. The parties have proposed to the Court that the discovery period extend to June 1, 1990; however, it is possible that one or both parties may seek an extension of the discovery period beyond that date. The Government anticipates filing a motion for summary judgement approximately 45 days after the discovery period cut-off date. The parties have proposed that they file a joint pre-trial schedule, if necessary, 20 days after the court has ruled on dispositive motions.

COOLING WATER FACILITIES

Mr. Bevill. What is the status of the construction of additional cooling water facilities at Savannah River?

Mr. Tuck. A contract for design and construction of a natural draft cooling tower for K Reactor was awarded in October 1989. Design efforts are approximately fifty percent complete at this time. The tower site has been cleared and excavation work is underway. The subsoil grouting required to provide a firm foundation for the tower is complete. Project completion is scheduled for December 1992.

Mr. Bevill. What is the current cost estimate for additional cooling towers at the Savannah River Site?

Mr. Tuck. The projected cost of the K Reactor cooling tower has been reduced to $79 million through an aggressive value engineering and cost control program. This is $48 million less than originally estimated. There are no current plans for any additional cooling towers, other than for K Reactor, at the site.

Mr. Bevill. What is the thermal discharge off the Savannah River site, with and without additional cooling facilities?

Mr. Tuck. The 180 degree water discharged from the K-Reactor has an environmental impact on two on-site streams and approximately 790 acres of on-site swamp. The design of the planned cooling towers is intended to protect indigenous aquatic populations on-site, in keeping with the Clean Water Act. With or without additional cooling facilities, the water has cooled to ambient temperatures by the time it leaves federal property and has essentially no off-site thermal impact.

ENVIRONMENT AND SAFETY CONCERNS

Mr. Bevill. What damage to the environment is being done on and off the Savannah River site as a result of the operation of the production site?

Mr. Tuck. The Department is very concerned about the potential environmental impacts of its production activities. The environmental surveillance activities at and in the vicinity of the Savannah River Site comprise one of the most comprehensive environmental monitoring programs in the United States. DOE is continually monitoring its tritium releases both to the atmosphere and to the Savannah River. To protect groundwater, an effluent treatment facility was constructed and began operation in October 1988. This facility will treat wastewater from the chemical separations facilities in order to eliminate the use of the seepage basin. In 1988, the population dose commitment from SRP atmospheric releases to individuals within 80 kilometers of the site was well below EPA National Emission Standards for Hazardous Air Pollutants limits for tritium. A replacement tritium facility is presently under construction which will further reduce tritium air emissions. In addition, for all surface water releases, the maximum individual dose from tritium to downstream Savannah River water users was well below the EPA drinking water standard.

Mr. Bevill. Does the Department voluntarily comply with Federal and state environmental regulatory requirements at defense production sites?

Mr. Tuck. In recent years, DOE has taken important steps to begin to change its practices to conform to the present day environmental laws and regulations. The Department acknowledges that it was slow in applying these laws to its facilities and intends to address all environmental concerns at its defense production sites.

Mr. Bevill. Does the Department have flexibility in complying with these requirements?

Mr. Tuck. The only flexibility available to the Department would have to come from the statutory terms of the applicable environmental law.

Mr. Bevill. What is the expected life of the Savannah River reactors? Are there any known life-limiting conditions?

Mr. Tuck. No life-limiting conditions at the Savannah River Site reactors have been identified, however, these reactors are nearly 40 years old. With the improved maintenance practices we are initiating, we are optimistic that these reactors will be able to operate until new capacity is available.

Mr. Bevill. How long is K reactor expected to operate with any newly constructed thermal mitigation system?

Mr. Tuck. K Reactor is expected to operate for at least seven but probably 10 or more years after the cooling tower is completed.

SPECIAL ISOTOPE SEPARATION

Mr. Bevill. Please describe the status of the Special Isotope Separation (SIS) project. What activities by site will be performed in FY 1990 and FY 1991 to close out the project?

Mr. Tuck. Current budget constraints have forced the Department to reevaluate its decision to proceed with the construction of the Special Isotope Separation facility in Idaho. Accordingly, the Department plans to conduct and complete an orderly phaseout of the construction project with FY 1990 funds.

To preserve a viable option for future deployment of SIS weapon-grade plutonium contingency, the Department intends to complete the development of the SIS technology at the Lawrence Livermore National Laboratory in California by the end of FY 1991. After a careful consideration of alternatives, the

Department has concluded that the verification tests in the Engineering Demonstration System facility at LLNL should be completed with non-hazardous surrogate materials in lieu of plutonium. This approach promotes a timely and cost effective completion of development while avoiding the additional hazard of plutonium operations and subsequent facility decontamination.

Recognizing that there are potential alternate applications for this technology, the Department has initiated a study by the National Academy of Sciences to identify those considered most promising. The Department will also aggressively transfer technologies developed in support of the SIS program to the defense complex at large and, as appropriate, to the private sector as well.

ADVISORY COMMITTEE ON NUCLEAR FACILITY SAFETY

Mr. Bevill. What have been the activities of the Advisory Committee on Nuclear Facility Safety during the past year?

Mr. Tuck. Since its first meeting in March 1988, the Advisory Committee on Nuclear Facility Safety has conducted 15 full committee meetings and has established 10 subcommittees to meet as necessary to further investigate pertinent issues and obtain indepth information.

I will insert for the record a listing of activities the Advisory Committee provided the Department of Energy (DOE) during the past year. (The information follows:)

Activities Provided to DOE by the Advisory Committee on Nuclear Facility Safety

- An examination of the potential response of Brookhaven National Laboratory's high flux beam reactor to loss of coolant accidents and provided recommendations on appropriate conditions for safe restart

- A review of the Waste Isolation Pilot Plant's safety and environmental issues and state of readiness
- Comments on the Department's reorganization Notice SEN 6-89 (1) to pass advisory responsibility for the large reactors to the Defense Nuclear Facilities Safety Board; (2) to remove nuclear safety oversight from the role of Environment, Safety, and Health; and (3) to make the Department's line management responsible for safety
- Advice on restart of the Savannah River reactors
- Advice on DOE operations at the Rocky Flats facility
- Recommendations regarding airborne effluent containment systems at Pantex
- Advice on DOE safety policy and organization issues
- Review of safety issues at the Y-12 plant at Oak Ridge, Tennessee
- Review of technical data on the New Production Reactor design

Mr. Bevill. Is this Committee involved in the restart plans for the Savannah River reactors? If so, how?

Mr. Tuck. The Advisory Committee on Nuclear Facility Safety is reviewing the Savannah River Production Reactor Level 1 Probabilistic Risk Assessment, as well as selected safety issues arising from this risk assessment. Of particular interest to the Committee are issues such as the importance in dominant accident sequence of the Emergency Core Cooling system, common cause failures, human reliability analysis, and completeness of documentation.

Mr. Bevill. How is the Defense Nuclear Facilities Safety Board's charter and purpose different from the Advisory Committee? Is this Board involved in the restart plans for the Savannah River reactors? If so, how?

Mr. Tuck. The National Defense Authorization Act of 1989 established a Defense Nuclear Facilities Safety Board to provide an independent, high-level safety oversight of certain Department of Energy facilities. Its purposes are to review and evaluate the content and implementation of the standards relating to the design, construction, operation, and decommissioning of defense nuclear facilities of the DOE; to conduct investigations; to conduct analysis of design and operational data; and to make recommendations to the Secretary of Energy with respect to DOE defense nuclear facilities.

The Advisory Committee on Nuclear Facility Safety was established by the DOE to provide advice to the Secretary on significant safety concerns related to the Department's nuclear production and utilization facilities. The recommendations by the Advisory Committee can influence the startup or shutdown for safety reasons of the Department's nuclear and non-nuclear facilities.

Until such time as the Board is fully operational, I have requested that the Committee continue its independent external oversight role relative to those defense facilities statutorily assigned to the Board. In addition, I am establishing a broader focus and role for the Committee to include non-nuclear, as well as nuclear facilities, and also to review nuclear safety policies, nuclear facility safety at Pantex and the Nevada Test Site, and environmental and health safety activities.

The Defense Board is involved in the restart plans of the Savannah River reactors. The board visited the Savannah River facility on November 7-9, 1989, and on February 22, 1990, and forwarded to the Department a set of formal recommendations regarding restart. The Department is presently reviewing those recommendations.

Mr. Bevill. Will the Department maintain both of these boards?

Mr. Tuck. The Defense Board, as created by Congress, is not under the authority of the Department of Energy; however, the Department will cooperate with it and provide the information and assistance it requests to perform its statutory authority to oversee assigned DOE defense nuclear facilities. When the Defense Board is fully staffed and operational, the Department will plan to focus activities of the Advisory Committee on Nuclear Facility Safety to non-defense nuclear and non-nuclear programs of the Department.

Mr. Bevill. Is the Department using outside groups like the National Academy of Sciences to provide special analyses of its facilities? If so, how?

Mr. Tuck. Since 1986, the National Academy of Sciences and the National Research Council have provided the Department of Energy with three special studies: Safety Issues at the Defense Production Reactors, National Academy Press, Washington, DC 1987; Safety Issues at the DOE Test and Research Reactors, National Academy Press, Washington, DC 1988; and The Nuclear Weapons Complex, National Academy Press, Washington, DC 1989. The National Research Council also has a standing board on radioactive waste management which is currently conducting a study for the Department concerning the Waste Isolation Pilot Plant (WIPP) at Carlsbad, New Mexico, and the single-shelled tanks at Hanford, Washington.

N REACTOR

Mr. Bevill. What is the current status of the N Reactor at Richland, Washington?

Mr. Tuck. Efforts to place the N Reactor at Hanford in dry layup resumed in October 1989 and are expected to be completed by the end of FY 1990.

Mr. Bevill. What activities on the N-Reactor were accomplished last year? What is planned to be accomplished in the future?

Mr. Tuck. In FY 1989 the major activities included preparing the reactor and the fuel fabrication facility for layup and completing remaining safety analyses. Since the reactor is being placed in dry standby to preserve the option of future operation if required, we also conducted some limited evaluations on the production of tritium in N Reactor. In summary, layup of the reactor major and secondary systems will be completed by the end of FY 1990. Cleanout of the N Reactor fuel storage basin will be completed by the end of FY 1991. Completion of layup of the K Area fuel storage basins will be a function of the PUREX schedule. Layup of the fuel fabrication facility has been completed.

Mr. Bevill. How many people and how much funding will be involved with maintaining N-Reactor in "Cold Standby" status?

Mr. Tuck. Cold standby status will not be completely achieved until all the irradiated N Reactor fuel has been shipped from the KE and KW reactor fuel storage basins to PUREX and those basins have been emptied and cleaned.

During the next few years irradiated N Reactor fuel storage, handling and shipping activities will be conducted at the KE and KW fuel storage basins. In FY 1990 the reactor operations and supporting services funding requirements for N Reactor are about $64 million and the year-end direct and indirect personnel count will be about 460. The FY 1990 reprogramming request provides this level of funding. In FY 1991 these requirements will decrease to about $39 million and 370 personnel. This lower level will decrease slightly for a few years until the KE and KW fuel storage basins are placed in cold standby.

Mr. Bevill. What is the status of other materials production facilities at the Hanford Reservation?

Mr. Tuck. Efforts to place the N Reactor in dry layup resumed in October 1989 and are expected to be completed by the end of the fiscal year.

In preparation for an extended plant outage, the PUREX is scheduled to complete limited operations intended to cleanout the facility in mid-March 1990. During the subsequent planned outage, provisions will be made to meet environmental compliance regulations for the discharge of liquid effluent. We currently plan for the PUREX to resume operation in December 1990 to conduct the processing of existing stockpiles of N Reactor irradiated spent fuel.

The recovery and metal production facilities at the Plutonium Finishing Plant will be operated to recover plutonium from scrap and other process materials for conversion to plutonium metal. We expect to maintain these capabilities into the mid-1990's.

Mr. Bevill. Are the Plutonium Finishing Plant and PUREX operating? If not, what is the schedule for operation?

Mr. Tuck. The Plutonium Finishing Plant, PFP, is currently undergoing a readiness evaluation for the resumption of plutonium scrap processing operations in the Plutonium Reclamation Facility, PRF. This evaluation is expected to be completed in May 1990. When PRF processing operations provide sufficient quantities of plutonium product, the Remote Mechanical C, or RMC, Line in the PFP will begin conversion of the plutonium product to metal form. Operations in the PRF and the RMC Line will continue into FY 1991 to process plutonium products in support of the nuclear weapons program.

During March, the PUREX Plant is scheduled to complete a short processing campaign to cleanout fuel and solutions that had been in-process when PUREX operations were terminated in December 1988. This cleanout campaign was conducted only after extensive review and upgrading of training, operating procedures, and equipment systems. The PUREX Plant has now been placed in standby for a routine maintenance outage. Additionally, facilities for the storage and treatment of process water discharges from the PUREX Plant to assure full compliance with environmental regulations will be constructed. The PUREX Plant is scheduled to resume operations during the first quarter of FY 1991 to process the remaining inventory of N Reactor fuel.

PLUTONIUM SCRAP RECOVERY

Mr. Bevill. Please identify by site and amount the plutonium scrap recovery activities performed throughout the weapons complex.

Mr. Tuck. There are four sites that are involved in weapon-grade plutonium processing throughout the weapons complex. The feed materials for these plutonium processing activities come from reactor production, retired warheads, and scrap backlogs. These four sites are Los Alamos National Laboratory, Rocky Flats Plant, Richland, and Savannah River Site. The Los Alamos National Laboratory is scheduled to recover about *Deleted* of weapon-grade plutonium during FY 1991 with scrap backlog being the source of feed material. Richland will process about *Deleted* of weapon-grade plutonium with a combination of feed from existing reactor product and scrap backlog. The Savannah River Site is expected to recover about *Deleted* of weapon-grade plutonium with the feed coming from a variety of sources with retired warheads providing the majority of the feed materials. Finally, the Rocky Flats Plant will recover about *Deleted* of weapon-grade plutonium during FY 1991. Of this, about *Deleted* will be recovered from retired warheads and the remaining *Deleted* will be from scrap recovery activities. These scrap processing activities include scrap feed from backlogged materials as well as scrap generated during the recovery of retired warheads and building of new warheads.

Mr. Bevill. Are there additional accelerated scrap recovery activities that could help meet plutonium requirements that are not in the defense programs' budget? Why not?

Mr. Tuck. As indicated by Dr. Barker's March 12, 1990, testimony, our

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Given this situation, our FY 1991 budget request includes all needed funding to enable DOE to recover as much plutonium from residues as the condition of our processing facilities permits. The plutonium recovered will provide marginally the amount required for manufacturing operations, *Deleted* As discussed in response to your previous question, these facilities include our processing capabilities at Los Alamos National Laboratory, Rocky Flats Plant, Richland, and the Savannah River Site. We do not see any significant ways to increase the supply of plutonium by funding accelerated scrap recovery operations. We are concerned about our ability to meet the revised requirements as indicated by Admiral Barr on March 12, 1990. These forecasts are optimistic since we assume that ongoing internal DOE reviews or external oversight bodies will not identify significant additional problems which must be addressed or that there will be no future litigation to prevent operation of our facilities.

Mr. Bevill. Please describe the status of the cleanup work that is being conducted at the Fernald site.

Mr. Tuck. Environmental improvement projects during the last several years have focused both on restoration/cleanup activities to identify and address problems and concerns resulting from historic operations of the facility, and improvements designed to prevent any future damage to the environment.

Cleanup work has been segmented into five operable units to expedite remediation. A Remedial Investigation/Feasibility Study, RI/FS, covering the active FMPC production area and suspect areas outside the production area, the inactive waste storage area, the silos, other Waste Units, and the environmental media is in progress; the remedial investigation is approximately 40 percent complete, and the feasibility study is 10 percent complete. Draft Records of Decision for the operable units are expected to be completed in August 1991, December 1991, and March 1992; final completion of the RI/FS is projected for May 1992.

In addition, the Department has initiated a removal action concerning treatment of contaminated groundwater found under FMPC facilities. Evaluations of the need for removal actions affecting waste pit run-off, south plume groundwater contamination, and K-65 silos 1 and 2 are underway. If the evaluations indicate removal actions are warranted, they will be initiated in 1990 and 1991.

Regulatory actions include the amendment of the existing Federal Facilities Compliance Agreement, entered into with EPA in 1986, to change the CERCLA portion to include the operable unit concept and provide amended remediation schedules. The agreement has been signed by DOE and will be transmitted to EPA for their concurrence on Monday, April 9, 1990. A RCRA implementation plan is in place to assign responsibilities for storage/disposal and underground storage tank requirements. Under this plan, newly-configured hazardous waste accumulation areas have been established at several locations throughout the facility, and procedures have been established for regular and frequent inspections.

Significant environmental accomplishments to date include: Emissions controls - A high efficiency particulate air filter has been installed at Plant 9 to address radionuclide emissions to the atmosphere. Similar systems have been installed at Plant 5, and stack monitors and alarms have been installed at various locations; Thorium repackaging - Removal and repackaging of the bulk thorium at Plant 8 was completed in March 1989, followed by demolition and decontamination of the silo and bin. Overpacking of thorium metal in outside storage began in February 1990; completion is expected in June; Waste shipment - Approximately 180,000 drum equivalents of low level radioactive waste have been disposed of since 1985; and Chemistry inventory reduction - All inventories of anhydrous hydrogen fluoride and ammonia have been removed from the facility. Also, 973 tons of uranium hexafluoride have been removed.

FERNALD FEED MATERIALS PRODUCTION CENTER

Mr. Bevill. What funding is being directed at the cleanup of the Fernald site in FY 1989, FY 1990, and FY 1991?

Mr. Tuck. I will submit the data for the record. (The information follows:)

The following table summarizes Environmental Restoration and Waste Management funding for the Feed Materials Production Center at Fernald, Ohio.

Feed Materials Production Center
(Dollars in Thousands)

	FY 1989	FY 1990	FY 1991
Environmental Restoration	$ 19,392	$ 39,820	$ 82,482
Corrective Activities	3,078	10,185	27,964
Waste Management	17,374	32,285	33,453
Total	$ 39,844	$ 82,290	$143,899

Activities to be supported by the FY 1991 request include: (1) completion of the design of an advanced wastewater treatment facility; (2) design and installation of storm water run-off control systems; (3) construction of an air emission monitoring system; repair or replacement of portions of the sanitary sewer system; (4) decontamination of FMPC-generated scrap metal; (5) continued processing of low level waste; (6) completion of upgrades for a storm sump for the decontamination pad and a clean scrap storage pad; and (7) processing, analysis, and disposal of currently generated low-level waste.

Mr. Bevill. What is the current operational status of the Fernald Feed Materials Production Center? Are any materials being produced? If not, is there a need for this facility?

Mr. Tuck. Slightly enriched uranium operations at FMPC were halted with the standdown of the Hanford N Reactor. Depleted uranium production has been suspended since July 1989 to concentrate contractor efforts on safety improvements and site cleanup.

We believe that alternative sources of depleted uranium for weapons requirements can be found and our objective is to phase out depleted uranium production operations in favor of procurement from the private sector. A vendor qualification program is currently underway and we expect to issue a purchase order for delivery of depleted uranium from a commercial source in September 1990. We will, however, maintain FMPC's depleted uranium facilities in standby pending the success of the vendor qualification program.

Mr. Bevill. Please describe the vendor qualification program for commercial sources of depleted uranium.

Mr. Tuck. Last year's Modernization Report recommended that the DOE transfer depleted uranium production activities from the FMPC with a goal of terminating such activities by the mid-1990's. The Office of Nuclear Materials Production chartered a task force in early 1989 to develop an integrated plan for qualifying commercial vendors by the procurement and evaluation of test depleted uranium derby material. The task force located available vendors and by mid 1989, a plan for evaluating all vendors wishing to participate had been developed which called for regular product delivery to begin in late FY 1992 or early FY 1993. On July 10, 1989, concerns regarding environmental, safety, and health compliance led to the suspension of all FMPC operations which did not support regulatory enhancement or utility services. It was immediately recognized that this shutdown would impact adversely upon Y-12 and Rocky Flats depleted uranium requirements. As it became clear that the shutdown would be of an undetermined length, the decision was made to have DOE's Oak Ridge Operations Office develop a procurement plan to provide a continuing supply of depleted uranium to Y-12 and Rocky Flats.

Due to the unplanned suspension of operations at the FMPC it has been necessary for Y-12 to develop two procurement strategies; short-term and long-term. The likelihood that the FMPC would not support needs for FY 1991 required the development of a special emergency procurement plan for that year. Two vendors were selected as most likely to meet the need for initial product delivery by October 1, 1990, and they have already begun producing qualification material for evaluation. For the long-term, all interested vendors who can legally supply material will be allowed to submit derbies for evaluation and subcontracts for base award and four one-year options will be awarded to cover the period from FY 1992 to FY 1996.

The core of the qualification schedules is the evaluation process. Y-12 plans to obtain 50 to 60 derbies from each potential vendor and evaluate them chemically and metallographically against vendor supplied data. If the results are satisfactory, the qualification derbies will be used to make actual components of depleted uranium, *Deleted* and uranium-niobium alloy. The components will then be analyzed and matched against specifications to insure that vendor material is completely satisfactory. This process is estimated to take from four to five months.

Mr. Bevill. Why do SIS operating expenses increase at Idaho when the program is being closed out? What are the outyear costs through complete close out?

Mr. Tuck. Although the FY 1991 President's Nuclear Materials Processing budget request for Idaho shows a net increase in operating funds over FY 1990, there is a significant decrease in operating funds requested for the SIS project in Idaho. The net increase in the proposed Idaho operating budget for FY 1991 results from increases in the fuel area which more than offset the decrease in the SIS budget. Full SIS Program closeout will require $66.5 million in FY 1991 for the completion of the downscaled SIS development program at the Lawrence Livermore National Laboratory and a projected maximum of $25 million in FY 1992 to cover deferred closeout costs.

Mr. Bevill. Why does funding for the Los Alamos Critical Experimental Facility increase by 40 percent?

LOS ALAMOS CRITICAL EXPERIMENTAL FACILITY

Mr. Tuck. The Los Alamos Critical Experimental Facility is the only facility in the Nation that offers hands-on training in nuclear criticality safety, and is the last operating general purpose facility in the United States for measurements related to nuclear criticality. A serious shortage of experienced, qualified nuclear criticality safety specialists to operate the facility has been identified. Requirements for enhanced safeguards and security and for compliance with new environment, safety, and health directives need to be accommodated. Failure to meet these requirements will impact the productivity of LACEF. Consequently, an increase of 40 percent in the level of funding for this facility is necessary.

Mr. Bevill. Please provide the amount of enriched materials for each customer in FY 1989, FY 1990, and FY 1991.

Mr. Tuck. The amount of enriched uranium for the Naval Reactors program included in our budget submission is

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Mr. Bevill. What is the minimum running rate at the High Enrichment Facility? Are modifications being made to reduce the minimum operating rate?

Mr. Tuck. According to information I've received from the Office of the Assistant Secretary for Nuclear Energy, the uranium enrichment complex can produce highly enriched uranium at a minimum rate of about 10 kilograms per day and meet customer product specifications. The Office of Uranium Enrichment has evaluated a scenario whereby it would reduce the highly enriched uranium production rate to about 5 kilograms per day but the resulting uranium product would not meet Naval Reactor specifications. However, the material is useable by Defense Programs for operation of the SRS tritium production reactors. The Department plans to reduce throughput at the Portsmouth "top" to the 5 kilogram per day rate in the very near future.

Mr. Bevill. How have requirements for enriched materials changed since the FY 1991 budget request was submitted?

Mr. Tuck. The FY 1991 budget submission assumed that enriched uranium requirements were *Deleted* in FY 1990 and FY 1991. There is currently *Deleted* enriched uranium in FY 1990. The FY 1991 estimate is for *Deleted* The FY 1990 reprogramming for Defense Programs reflects the change in FY 1990.

Mr. Bevill. Please provide the various amounts and types of nuclear materials produced by facility for FY 1989, FY 1990, and FY 1991 and explain changes.

Mr. Tuck. There has been no production of nuclear material since the shutdown of the Savannah River Site reactors. These reactors were shutdown in FY 1988 and are scheduled to resume production during FY 1991. During the period of shutdown, nuclear material demand has been and will continue to be satisfied through existing inventories. Once the SRS reactors resume operations, we expect that all three reactors will produce tritium only. The quantity of tritium projected to be discharged during FY 1991 is *Deleted*

Deleted This is based upon a partial unloading during what is referred to as a mid-cycle discharge. There is a possibility the SRS reactors will need to produce about 5 kgs of plutonium-238 during FY 1991.

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Mr. Bevill. Please provide a table showing total funding at the various locations supported by Nuclear Materials Production for FY 1989, FY 1990, and FY 1991. Please identify separately each construction project.

Mr. Tuck. I will provide that data for the record. (The information follows:)

NUCLEAR MATERIALS PRODUCTION
SITE FUNDING
(IN THOUSANDS OF DOLLARS)

	FY 1989	FY 1990	FY 1991
Albuquerque			
Operating Expenses	$ 28,607	$ 19,890	$ 20,422
Capital Equipment	1,925	985	895
Construction	1,200	1,181	300
Total, Albuquerque	$ 31,732	$ 22,056	$ 21,617
Chicago			
Operating Expenses	$ 379	$ 0	$ 0
Idaho			
Operating Expenses	$ 99,060	$ 105,329	$ 119,190
Capital Equipment	6,982	8,500	8,000
Construction:			
GPP	3,800	7,240	5,558
90-D-141 ICPP Fire Protection Upgrade	0	3,447	6,000
86-D-148 SIS Production Plant	17,000	29,826	0
85-D-139 Fuel Processing Restoration	50,100	73,875	87,500
Total, Idaho	$ 176,942	$ 228,217	$ 226,248
Oak Ridge			
Operating Expenses	$ 257,546	$ 240,943	$ 270,841
Capital Equipment	10,735	10,436	8,598
Construction:			
GPP	3,984	1,169	2,290
86-D-149 Productivity Retention Program	31,180	21,197	1,000
87-D-159 FMPC Environmental Upgrade	49,965	40,450	14,133
Total, Oak Ridge	$ 353,410	$ 314,195	$ 296,862
Richland			
Operating Expenses	$ 234,960	$ 209,818	$ 199,951
Capital Equipment	13,739	12,657	9,310
Construction:			
GPP	5,918	4,242	4,351
90-D-143 PFP Fire Safety and Loss Limitation	0	788	2,500
86-D-149 Productivity Retention Program	0	2,068	3,800
Total, Richland	$ 254,617	$ 229,573	$ 219,912

	FY 1989	FY 1990	FY 1991
San Francisco			
Operating Expenses	$ 69,279	$ 60,453	$ 44,000
Capital Equipment	601	1,969	0
Construction:			
GPP	600	1,772	0
86-D-148 SIS Production Plant ..	6,000	9,574	0
Total, San Francisco	$ 76,480	$ 73,768	$ 44,000
Savannah River			
Operating Expenses	$ 857,834	$ 997,211	$ 1,281,815
Capital Equipment	62,253	65,997	77,819
Construction:			
GPP	15,003	16,679	24,495
82-D-124 Phases II-V	5,879	0	0
84-D-134 Safeguards and Security Improvements	11,584	0	0
85-D-145 Fuel Production Facility	9,700	0	8,481
86-D-149 Production Retention Program	43,460	57,288	56,950
86-D-152 Reactor Electrical Distribution System	6,000	3,117	0
86-D-156 Plantwide Safeguards Systems	12,800	6,088	0
87-D-152 Environmental Protection	2,224	0	0
88-D-153 Additional Reactor Safeguards	5,700	6,304	1,000
89-D-140 Additional Separation Safeguards	5,300	10,146	16,300
89-D-148 Improved Reactor Confinement System	2,000	6,994	12,800
90-D-150 Reactor Safety Assurance	0	12,509	32,600
90-D-151 Engineering Center	0	6,895	4,000
90-D-149 Plantwide Fire Protection	0	4,826	49,100
91-D-143 Increased Electrical Substation Capacity	0	0	6,000
91-D-145 New Whole Body Counter Facility	0	0	4,350
91-D-148 Reactor Charge/Discharge Training Simulator	0	0	2,000
Total, Savannah River	$ 1,039,737	$ 1,194,054	$ 1,577,710
Headquarters			
Operating Expenses	$ 9,365	$ 29,555	$ 25,651
Capital Equipment	46	0	1,000
Construction:			
90-D-142 Coal Storage Facility Environmental Upgrade	0	906	0
Total, Headquarters	$ 9,411	$ 30,461	$ 26,651
Total, Nuclear Materials Production	$ 1,942,708	$ 2,092,324	$ 2,413,000

Mr. Bevill. Please provide the employment levels at all Materials Production sites in FY 1989, FY 1990, and FY 1991.

Mr. Tuck. I will provide the data for the record. (The information follows:)

NUCLEAR MATERIALS PRODUCTION
EMPLOYMENT LEVELS
(FULL-TIME EQUIVALENTS)

	FY 1989	FY 1990	FY 1991
Albuquerque	200	109	115
Idaho	1,247	1,199	1,209
Oak Ridge	915	586	586
Richland	4,300	3,900	3,700
San Francisco	641	443	433
Savannah River	8,459	9,685	10,025
Total, Nuclear Materials Production	15,762	15,922	16,068

Mr. Bevill. Please provide a table showing the total funding for environmental, health, and safety projects included in the Nuclear Materials Production budget by location for FY 1989, FY 1990, and FY 1991.

ES&H PROJECTS

Mr. Tuck. A table reflecting funding for environment, safety, and health projects included in the Nuclear Materials Production budget will be inserted for the record. (The information follows:)

NUCLEAR MATERIALS PRODUCTION
ENVIRONMENT, SAFETY, AND HEALTH PROJECTS
(IN THOUSANDS OF DOLLARS)

	FY 1989	FY 1990	FY 1991
Idaho			
90-D-141, Idaho Chemical Processing Plant Fire Protection, Idaho National Engineering Laboratory, Idaho	$ 0	$ 3,447	$ 6,000
Total, Idaho	$ 0	$ 3,447	$ 6,000
Oak Ridge/FMPC			
87-D-159, Environmental, Health and Safety Improvements Phases I, II, III, and IV	$ 49,965	$ 40,450*	$ 14,133
Total, Oak Ridge/FMPC	$ 49,965	$ 40,450	$ 14,133
Richland			
90-D-143, Plutonium Finishing Plant Fire Safety and Loss Limitation	$ 0	$ 788	$ 2,500
Total, Richland	$ 0	$ 788	$ 2,500

*Funding for this project is also included in the Department's Environmental Restoration and Waste Management Program.

	FY 1989	FY 1990	FY 1991
Savannah River			
85-D-145, Fuel Production Facility	$ 9,700	$ 0	$ 8,481
86-D-152, Reactor Electrical Distribution System	6,000	3,117	0
87-D-152, Environmental Protection, Plantwide	2,224	0	0
89-D-148, Improved Reactor Confinement System	2,000	6,994	12,800
90-D-149, Plantwide Fire Protection	0	4,826	49,100
90-D-150, Reactor Safety Assurance, Phases I and II	0	12,509	32,600
91-D-145, New Whole Body Counter Facility	0	0	4,350
91-D-148, Reactor Charge/Discharge Training Simulator	0	0	2,000
Total, Savannah River	$ 19,924	$ 27,446	$ 109,331
Headquarters			
90-D-142, Coal Storage Facility Environmental Upgrade	$ 0	$ 906	$ 0
Total, Headquarters	$ 0	$ 906	$ 0
Total, Nuclear Materials Production Projects	$ 69,889	$ 73,037	$ 131,964

Mr. Bevill. Why are environmental compliance activities for Idaho and Richland landlord facilities included as a separate program in the Atomic Energy Defense Activities appropriation rather than being included in the Environmental Restoration appropriation with the rest of the Department's facilities?

Mr. Tuck. The new Environmental Restoration and Waste Management appropriation consolidates cleanup and restoration activities contained in the Five-Year Plan which were previously funded within Defense Programs, Nuclear Energy, and Energy Research appropriations. This separate appropriations account is intended to ensure that funds meant for cleanup and environmental restoration will be spent according to the priorities established among competing cleanup projects and not dependent on what remains after DOE production and other program needs have been satisfied.

The Landlord program was not included in the Five-Year Plan issued last August. Landlord activities include maintenance of sitewide infrastructures through central planning, maintenance, procurement, and construction of common use equipment, facilities, utilities and roadways. The Landlord program also supports health, security, planning, and inspection activities that cannot be directly associated with a specific program.

ADDITIONAL QUESTIONS FROM CHAIRMAN BEVILL

Mr. Bevill. Please provide at the budget level of detail all funds included in FY 1989, FY 1990, and FY 1991 for the SRAM-T and the FOTL warheads.

Mr. Tuck. I will provide for the record a table that details the FY 1989, FY 1990, and FY 1991 funding for the SRAM-T and FOTL warheads. (The information follows)

FOLLOW-ON TO LANCE MISSILE/
SHORT-RANGE ATTACK MISSILE TACTICAL
(Dollars in Millions)

	FY 1989	FY 1990	FY 1991
RD&T			
Operating	$ 0	$ 10.3	$ 48.5
P&S			
Operating	0	7.3	19.3
Construction	0	0	18.5
Total P&S	$ 0	$ 7.3	$ 37.8
Total	$ 0	$ 17.6	$ 86.3

NEW PRODUCTION REACTORS

Mr. Bevill. Are the construction schedules for the NPR's stretched out due to fiscal constraints?

Dr. Monetta. At this time, in FY 1990, our design schedules which are funded with capital or construction dollars are not constrained by funding. These schedules are based on proponent data because we have not yet received conceptual designs from the contractor design teams. The conceptual designs will contain budget quality cost and schedule data.

Mr. Bevill. Could construction time be shortened if funding were increased?

Dr. Monetta. It may be possible to accelerate the schedules in FY 1991 and beyond if funding were increased. However, we will not know the answer to this question with any precision until after we have received the conceptual designs.

Mr. Bevill. Have there been any changes in the program strategy since last year?

Dr. Monetta. No, the New Production Reactors program strategy has been and will remain the same until a Record of Decision is reached. Our preferred strategy, which incorporates the concept of duality, is to design and construct a heavy water reactor at the Savannah River Site; a modular high-temperature, gas-cooled reactor plant at the Idaho National Engineering Laboratory; and, as a contingency, to develop a light water reactor tritium target.

TECHNICAL ISSUES REMAINING FOR NPR

Mr. Bevill. What major technical issues need to be resolved prior to final design and construction of the NPR's?

Dr. Monetta. At this time, there are no anticipated technical issues that cannot be resolved. However, all three reactor technologies have technical issues that should be resolved prior to final design and construction. These issues are primarily associated with new or improved design features associated with the proposed plants and these new features require analysis and testing to verify their adequacy. For example, the primary issues associated with the heavy water reactor concept are: the effectiveness of natural circulation shutdown cooling under abnormal conditions, the performance of coolant up-flow rather than down-flow as in the current heavy water reactors at the Savannah River Site, and, finally, the behavior of the reactor core and primary cooling system under abnormal transient and postulated accident conditions.

The modular high-temperature gas cooled reactor concept also has three primary technical issues. First, the tritium targets are basically similar in design and construction to the fuel, but the experience base for fabrication, in-reactor performance, and processing to collect the tritium is limited. This experience base must be expanded to verify and qualify the process. The operating experience base in the United States for the selected fuel form is also limited, and therefore a similar development and verification effort is required to qualify the fuel for in-reactor operation and also the fuel fabrication process. Finally, the performance of key reactor and plant components such as the fuel handling equipment, steam generator and the helium circulator must be confirmed via a testing program.

Only one significant technical issue exists for the light water reactor technology. The proposed tritium target has not been used for production purposes and requires further development and qualification prior to tritium production in the WNP-1 reactor.

SAFETY

Mr. Bevill. Will the safety standards for the NPR's be commensurate with similar facilities outside the Government?

Dr. Monetta. Yes, the Department has made the commitment that the new production reactors will provide a level of safety and of safety assurance that meets or exceeds that offered to the public by modern commercial nuclear power plants. In order for us to accomplish this, the levels of safety we apply to the NPRs will be at least commensurate with those applied to nuclear reactor facilities in the commercial sector.

Mr. Bevill. How will decisions on the required level of safety measures needed for the NPR's be made in the Department?

Dr. Monetta. The Office of Nuclear Energy has been assigned responsibility for developing and coordinating Departmental policy for the safety of nuclear reactors. This responsibility entails the establishment, issuance, and maintenance of nuclear safety standards which will be applied to the new reactors. Even more importantly, the safety measures needed for the NPR will be determined by the overall commitment to meet or exceed the level of safety and safety assurance of modern commercial nuclear power plants. A disciplined design process, assisted by modern methods such as probablistic risk assessment, will identify the measures necessary to assure the high levels of safety that will be achieved by NPR. This design process provides for decisions on the required level of safety to be made by line management up through the Secretary based on detailed analysis documented in safety analysis reports.

Mr. Bevill. Will these be independent oversight?

Dr. Monetta. The design decisions will be subject to independent review both by internal DOE organizations and by an external review body, the Defense Nuclear Facilities Safety Board.

Mr. Bevill. Will the oversight be advisory or mandatory?

Dr. Monetta. While the oversight function is advisory in nature, the Defense Nuclear Facilities Safety Board is an independent federal agency and its recommendations to the Secretary of Energy must be made public along with the required, formal response to the Board by the Secretary.

Mr. Bevill. What role does the Defense Nuclear Facility Safety Board play in development of a new production reactor?

Dr. Monetta. The Defense Nuclear Facility Safety Board reviews and evaluates defense nuclear facilities of the Department of Energy and recommends to the Secretary of Energy those measures that should be adopted to ensure that public health and safety are adequately protected. For the NPR, this will include the design, construction, operation and decommissioning phases of the program.

OVERSIGHT

Mr. Bevill. How many internal and external oversight, audit and/or review groups are currently interacting with the Office of New Production Reactors?

Dr. Monetta. Within the Department of Energy, I have two groups that advise me on the safety aspects of all DOE nuclear facilities. First, is the Office of Nuclear Safety made up of full time Federal staff. Second, is the Advisory Committee on Nuclear Facility Safety headed by Dr. John Ahearne and staffed by outside expert advisors.

Two safety oversight groups will report to the Director of the Office of New Production Reactors and will be focused solely on NPR facilities. First, is the Office of Safety and Quality, made up of full time Federal staff with extensive experience in nuclear reactor safety and regulation. Secondly, an Advisory Committee on New Production Reactor Safety to be made up of recognized expert advisors will also be created.

Finally, external to the Department of Energy, the Defense Nuclear Facilities Safety Board was created by the Congress to have oversight of the DOE's defense nuclear facilities. The Board is headed by John Conway.

ENVIRONMENTAL ISSUES

Mr. Bevill. What environmental issues have been raised on the NPRs?

Dr. Monetta. The environmental issues raised during the NPR EIS public scoping process, which occurred between September-December 1988, were: health and safety aspects of reactors and support facilities; and geological, air quality, water resources, and waste management.

Other issues added to the NPR EIS for evaluation as a result of the scoping process included: noise, land use, institutional issues, emergency preparedness and response, and regional effects of power sale and transmission.

Mr. Bevill. The program is proceeding with preparation of an environmental impact statement concurrent with development and project design activities. What are the potential disadvantages of this strategy?

Dr. Monetta. This strategy minimizes any potential disadvantage because of the way the program elements, environmental impact statement and engineering design, are administratively tied together inside the Office of New Production Reactors which is a highly focused program management organization.

Mr. Bevill. What are the current milestones for completion of the environmental impact statement?

Dr. Monetta. A recent milestone was the publication of the Implementation Plan for the EIS on January 31, 1990. The draft environmental impact statement will be issued in January 1991 with the final environmental impact statement expected in November 1991. No sooner than 30 days following the release of the final environmental impact statement, a Record of Decision will be published in the Federal Register.

Mr. Bevill. What are the overall amounts in the budget for the various NPR technologies including capital equipment and construction?

Dr. Monetta. The total FY 1991 budget request is for $363 million. The funding for capital equipment and construction is for design activities only. The breakdown of our budget request is shown in a table which I would like to insert in the record.

(The information follows:)

FY 1991 BUDGET FUNDING
(IN MILLIONS OF DOLLARS)

Activity	Total
Heavy Water Reactor	$ 18.6
Modular High-Temperature Gas Cooled Reactor (MHTGR)	11.2
MHTGR Tritium Target	26.2
Light Water Reactor Tritium Target	24.5
Safety & Quality	16.0
Technical Assessments	3.0
Environmental Compliance	8.3
Program Direction	25.1
Total Operating	$132.9
Capital Equipment	8.8
Construction	221.3
Total	$363.0

NPR MAJOR ACTIVITIES FOR FY 1990 AND FY 1991

Mr. Bevill. What major activities by technology will be undertaken in FY 1990 and FY 1991?

Dr. Monetta. There are several major activities that have been undertaken in FY 1990 and will continue into FY 1991. A summary of these activities is shown in a table which I would like to insert for the record.

(The information follows:)

	1990	1991
HWR	Complete Conceptual Design.	Continue Preliminary Design for both the Reactor and the Heavy Water Processing Facility.
	Initiate Preliminary Design.	Continue Confirmatory Development.
	Initiate Heavy Water Processing Facility design.	
	Continue Confirmatory Development.	
MHTGR	Complete Conceptual Design.	Continue Preliminary Design.
	Initiate Preliminary Design.	Prove Target Feasibility.
	Initiate Fuel & Target Facility Design.	Continue Confirmatory Development.
	Continue Target Development.	
	Continue Confirmatory Development.	
LWR	Refine Cost Estimate.	Prove Target Feasibility.
	Continue Target Development.	
	Reprocessing Need Study.	

NPR TWO-REACTOR STRATEGY

Mr. Bevill. In the current political climate, why is it necessary to maintain a two-technology, two-site strategy for new production reactors?

Dr. Monetta. The Department's preferred strategy of constructing two new reactor plants of different technologies at two sites is an issue of assured tritium supply. The duality strategy is essentially a strategy of assurance. It is a strategy that was conceived because of a need to guarantee that the Nation will always have a production capability to produce sufficient quantities of tritium for national defense. The Department is committed to this strategy of duality which will provide the highest degree of assurance that nuclear materials, primarily tritium, will be reliably produced in a safe secure and environmentally sound manner and in adequate amounts to meet national security needs well into the next century.

Mr. Bevill. How firm is the current total estimated cost of construction for the two-reactor strategy?

Dr. Monetta. The current Total Estimated Cost of construction for the preferred two-reactor strategy is approximately $7.0 billion in FY 1988 dollars. This is not a firm figure since it is based on proponent provided cost estimates with appropriate contingencies added. When the conceptual designs are completed the design teams will furnish us with cost data which we will evaluate to determine budget quality estimates.

Mr. Bevill. What is the total estimated cost of the two-reactor construction strategy currently being pursued?

Dr. Monetta. A budget quality total estimated cost for construction of the proposed two-reactor strategy currently being pursued will be established following completion of the conceptual designs. The preliminary cost-estimate of $3.2 billion in FY 1988 dollars for the Heavy Water Reactor and $3.6 billion for the Modular High-Temperature Gas-Cooled Reactors was derived from reactor technology proponent-provided cost estimates in July 1988 with additional contingency funding added.

In addition, the preliminary cost-estimate for Light Water Target Development, National Environmental Policy Act compliance activities and safety review process efforts brings the total preliminary cost-estimate to approximately $7.0 billion in 1988 dollars.

Mr. Bevill. What would be the dates of achieving initial operation of these two reactors?

Dr. Monetta. The dates for achieving initial operation of the Heavy Water Reactor and the first module of the Modular High-Temperature Gas-Cooled Reactor are approximately 2000.

HEAVY WATER REACTORS

Mr. Bevill. What would be the total estimated cost for constructing two heavy water reactors at the Savannah River Plant?

Dr. Monetta. The preliminary cost-estimate, based on proponent data, for constructing two heavy water reactors at the Savannah River Plant equalling the production capacity outlined in the preferred strategy is $4.7 billion in FY 1988 dollars. The total life cycle costs for these reactors would be $22.5 billion.

Mr. Bevill. What would be the dates for achieving initial operation of these two reactors?

Dr. Monetta. The dates for achieving initial operation of these two plants would be the years 1999 for the first reactor and 2001 for the second reactor.

HIGH TEMPATURE GAS-COOLED REACTORS

Mr. Bevill. What would be the cost for constructing two high temperature gas-cooled reactors at the INEL?

Dr. Monetta. The preliminary cost-estimate, based on proponent data, for constructing a 12-module high-temperature gas-cooled reactor plant at INEL equalling the production capacity outlined in the preferred strategy is $7.9 billion in FY 1988 dollars. The total life cycle cost, including steam sales as an offset, for these reactors would be $20.08 billion in FY 1988 dollars.

Mr. Bevill. What would be the dates for achieving initial operation of these two reactors?

Dr. Monetta. The date for achieving initial operation of the twelve modules would occur between the years 1999 and 2008.

LINEAR ACCELERATOR

Mr. Bevill. Last year there was discussion of the potential use of a linear accelerator to produce nuclear materials and a report was being prepared. What was the finding of the technical review of this technology?

Dr. Monetta. A report on the potential use of accelerator technology was produced by Brookhaven and Los Alamos National Laboratories. The final technical review considered accelerators to be technically too risky to meet programmatic schedule requirements. Also, substantial research and engineering development would be required before feasibility for large scale tritium production is established. Finally, a large amount of electric power, between 740 to 900 megawatts would be needed.

The Department has just received a new Energy Research Advisory Board report concerning accelerators and is currently evaluating its contents.

MAJOR NPR MILESTONES

Mr. Bevill. Please provide a schedule of all major milestones associated with the NPR through completion.

Dr. Monetta. The rationale for the preliminary NPR schedules was derived from the proposals submitted by the industrial proponents of the reactor technologies. A summary of the preliminary major milestones associated with the NPR program is shown in a table which I would like to insert for the record. (The information follows:)

	Milestone	Fiscal Year
	COMMENCE:	
HWR:	Conceptual Design	1990
	Preliminary Design	1990
	Long-Lead Procurement	1992
	Site Construction	1993
	Fuel Load	1998
	Production Operations	2000
MHTGR:	Conceptual Design	1990
	Preliminary Design	1990
	Long-Lead Procurement	1992
	Site Construction (1st Module)	1994
	Fuel Load (1st Module)	1998
	Reliability Test (1st Module)	1999
	Construct Remaining Modules	2000
	Construct Support Facilities	2000
	Production Operations	2001
LWR:	Complete Target Development	1993
NEPA:	Final EIS	1992
	Record of Decision	1992

Mr. Bevill. Please provide a detailed table showing the initial and the current allocation of FY 1990 funding. Explain why any changes were made.

Dr. Monetta. The major changes between the initial and current allocation of FY 1990 funding is provided in a table below which I would like to insert in the record. (The information follows:)

FY 1990 FUNDING
(Dollars in Millions)

		Initial	Current
o	HWR conceptual design Two conceptual designs being done.	$10	$20
o	LWR Tritium Target Opportunity to test in ATR earlier and desire to prove feasibility prior to ROD.	$ 4.9	$24.7
o	MHTGR Tritium Target Reduced to optimize both target efforts and ATR availability.	$32	$15.8
o	HWR Confirmatory Development Re-evaluation of requirements and transfer to cover second conceptual design.	$41.5	$34.5

REVIEW OF RECOMMENDATIONS

Mr. Bevill. Will your Board review the conclusions and recommendations prepared by other advisory groups? If so, what actions will the Board take on the specific recommendations developed by others?

Mr. Conway. Specific recommendations and conclusions developed by others that may impact on public health and safety will be evaluated as part of the Board's independent review of DOE defense nuclear facilities. The Board will consider the recommendations previously made by others as we develop recommendations that the Board will make to the Secretary of Energy to ensure adequate protection of public health and safety.

NEW PRODUCTION REACTOR

Mr. Bevill. What unique oversight or expertise will your Board have in reviewing the design of the New Production Reactor? How would you characterize your role during design and development of the NPR?

Mr. Conway. The Board by law is required to review the design of new Department of Energy defense nuclear facilities such as the New Production Reactor before construction begins, and to recommend to the Secretary such modifications of the design as the Board considers necessary to adequately protect the public health and safety. The Board also is required to periodically review and monitor construction activities. The Board intends to have the necessary technical expertise on staff or under contract to assist the Board Members in conducting timely design and construction reviews of new DOE production facilities from a public health and safety perspective.

FACILITIES UNDER DNFSB JURISDICTION

Mr. Bevill. Please provide for the record a list of all DOE facilities under the jurisdiction of the DNFSB. Has identification of these sites been completed.

Mr. Conway. The Board has received a second draft list of defense nuclear facilities from the Department of Energy. This list is submitted for the record. It is still under review by the Board and subject to change.

DOE FACILITIES UNDER THE JURISDICTION OF THE BOARD*

Los Alamos National Laboratory

- Plutonium Processing Facility (TA-55)
- CMR Building (TA-3-29)
- U Storage Facility (TA-3-164)
- Main Storage Vault (TA-41-1)
- Waste Disposal Site (TA-54)
- Tech Shops Addition (TA-3-102)
  Machining of uranium parts in excess of 2 kg is performed in this facility.
- Icehouse (TA-41-1)
  Routinely handles SNM parts and tritium
- Omega West Reactor (TA-2)
- Critical Experiment Facility (TA-18)

Facilities not yet constructed and/or started up

- Nuclear Materials Storage Facility (TA-55)
- Special Nuclear Materials R&D Laboratory (TA-55)

Mound Plant

- SW/R Complex

Sandia National Laboratories

- Hot Cell Facility (Building 6580), SNLA
- Annular Core Research Reactor (TA-5), SNLA
- Sandia Pulse Reactor (TA-5), SNLA

*Note: The Board's jurisdiction encompasses both the facilities listed herein and any piping or other systems that may connect the facilities.

Waste Isolation Pilot Plant (WIPP)

- Waste Handling Building
- Underground

Idaho

- Idaho Chemical Processing Plant (ICPP), Production Facility/Nuclear Waste Storage Facility
- Radioactive Waste Management Complex (RWMC)

  Nuclear Waste Storage Facility

  Transuranic Waste Storage Facility
- Mixed Waste Storage Facility (MWSF), Nuclear Waste Storage Facility

Although the Advanced Test Reactor may be considered a utilization facility by definition, it technically does not "operate for national security purposes," but rather supports the Naval Reactors program which is excluded from Board oversight by E.O. 12344 and P.L. 100-456.

Proposed Defense Nuclear Facilities

o	CPP-691	Fuel Processing Restoration Facility
o	High Level Waste Tank Farm Upgrade	New CPP Nuclear Waste Storage Facility
o	Calcined Solids Storage Facility #8	New CPP Nuclear Waste Storage Facility
o	Transuranic Storage Modules (4)	New Nuclear Waste Storage Facility

Y-12 Plant, Oak Ridge

o	Building 9212	Enriched uranium operations
o	Building 9206	Enriched uranium operations
o	Building 9215	Enriched uranium operations
o	Building 9215	Depleted uranium operations
o	Building 9998	Depleted uranium casting operations
o	Building 9201-5	Depleted uranium operations
o	Building 9204-4	Depleted uranium operations
o	Building 9204-4	Weapon disassembly & weapon quality evaluation
o	Building 9204-2	Lithium operations
o	Building 9204-2 E	Assembly operations

Proposed Defense Nuclear Facility

o Low Level Waste Disposal Facility (Bear Creek)

Feed Material Production Center, Fernald, Ohio

o	Plant 1	Sampling Plant
o	Plant 2/3	Refinery
o	Plant 4	Greensalt plant (blending operations only)
o	Plant 5	Metal production plant
o	Plant 6	Metal fabrication plant (pickling & inspection only)
o	Plant 8	Scrap recovery plant
o	Plant 9	Special products plant (salt bath only)
o	K-65 silos 1 & 2	Pitch blend storage

o	Thorium storage area	Approximately 13,000 containers of thorium

Oak Ridge Gaseous Diffusion Plant

o	K-25 Waste Storage Building	

Oak Ridge National Laboratory

o	Building 0319	U233 storage warehouse
o	Solid waste storage area #5	Remote transuranic waste storage
o	Melton Valley storage tanks	Low level liquid defense waste

Proposed Defense Nuclear Facility

o	Remote Handled TRU Waste Handling and Packaging Plant	

Hanford Site

o	N Reactor Complex (100 Area)	
	105N	Reactor Building
	109N	Heat Exchanger Building
	107N	Receiver Cooling Building
	163N	Demineralizer Plant
	181N	River Pump House
	182N	High Lift Pump House
	184N	Plant Service Boiler House
o	N Reactor Fuel Fabrication Facility (300 Area)	
	313 Building	Fuel Manufacturing Facility
	333 Building	Fuel Manufacturing Facility
o	100KE and 100 KW fuel basins and support facilities	
o	Purex Plant Complex (200 Area)	
	202A	Canyon Building
	224U	U03 Plant

- Plutonium Finishing Plant Complex (200 Area)

234-5Z	Plutonium Finishing
236-Z	Plutonium Reclamation
242-Z	Waste Treatment

- T Plant Complex (200 Area)

2706T	Canyon Building

- Waste Management Facilities
- Operational Tank Farms
- B Plant Complex
- Grout Treatment Facility
- Waste Receiving and Handling Facilities
- 242A Evaporator
- 222S Laboratory

Facility not yet started up

- Hanford Waste Vitrification Plant

Rocky Flats Plant

- Plutonium Recovery (Building 371)
- Waste Treatment (Building 374)
- Plutonium Analytical Lab (Building 559)
- Plutonium Manufacturing and Assembly (Building 707)
- Plutonium Recovery (Building 771)
- Plutonium Recovery and Waste Management (Building 776)
- Manufacturing (Building 777)
- Plutonium Development (Building 779)
- Product Staging (Building 991)
- Waste Treatment (Building 774)
- Waste Storage/Staging (Building 664)

Lawrence Livermore National Laboratory

o	Building 332	Plutonium Facility (contains SIS Engineering Demonstration Facility)
o	Building 625	Transuranic Waste Storage Facility

Savannah River Site

o	P, K, and L Reactors	Production operations
o	C and R Reactors	Long-term shutdown
o	F Canyon	Chemical separations
o	H Canyon	Chemical separations
o	F Area Outside Facilities	Ancillary operations to F Canyon
o	H Area Outside Facilities	Ancillary operations to H Canyon
o	F Area A Line	Reduction of U-238 U03 to powder
o	HB Line	Pu-238 Production
o	FB Line	Pu-239 Production
o	Pu Fuel Form Fabrication	Pu-238 heat source production
o	Actinide Billet Fabrication	Rx Target material fabrication
o	Multipurpose Processing Facility	Plutonium processing
o	Tritium facilities	Tritium processing
o	Receiving Basin for Offsite Fuels	Pool storage
o	F & H Area Tank Farms	High level liquid rad. waste storage
o	Burial Ground	Low level rad. solid waste disposal

o	Experimental TRU Waste Assay Facility	Certification of drummed transuranic waste for long-term storage
o	Production Control Facility	Process laboratory
o	Building 321-M	Rx fuel fabrication facility
o	Building 773-A	Savannah River Laboratory
o	Plutonium Experimental Facility	Developmental work glove box line
o	F&H Effluent Treatment Facility	Low level liquid rad. waste treatment

Facilities not yet constructed and/or started up

o	Defense Waste Processing Facility	High level liquid radioactive waste vitrification
o	Saltstone Facility	Concrete forms for low level fraction of high level liquid rad. waste
o	Uranium Solidification Facility	Uranium reclamation from Uranyl Nitrate
o	Consolidated Incineration Facility	Incineration of low level solid radioactive waste
o	Y Area Solidification and Disposal Facility	Preparation of fuel fabrication waste sludge for burial
o	Mixed Waste/Hazardous Waste Disposal Facility	Stabilization of mixed/ hazardous waste forms and vault burial
o	TRU Waste Facility	Retrieval and repackaging of stored transuranic waste drums and certified for long term storage

HQ (facility design/construction)

o New Production Reactors and nuclear facilities dedicated to supporting these reactors.

o Special Isotope Separation

DNFSB STAFF

Mr. Bevill. How many permanent employees have been hired to date and how many are on detail from other agencies?

Mr. Conway. The Board has hired eight full-time employees, three of which will report for duty in the next four weeks, and four employees are on reimbursable detail from two federal agencies.

TECHNICAL CONTRACTS

Mr. Bevill. Please list and describe the nature and amount of technical support contracts issued in FY 1990 and proposed for FY 1991.

Mr. Conway. The Board has ten technical support contracts in place, the nature and amount of which is shown in a table that I would like to insert in the record. These contracts are for the services of technical experts in areas such as seismic engineering; thermal-hydraulics; piping integrity; probabilistic risk assessment; nuclear safety standards; training and qualifications; and chemical engineering. Total FY 1990 obligations to date for technical support contracts are $745,500. The FY 1991 budget request includes $2,599,000 to fund technical support contracts for outside experts is these areas, and to provide the Board with the necessary flexibility to contract for technical support as we become aware of potential safety issues during our reviews.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

EXECUTED CONTRACTS

CONTRACTOR	COTR	NUMBER	AMOUNT	PERIOD OF PERFORMANCE	DEFINITIZATION DATE	TYPE OF WORK
Dr. Tong	Kouts	89-001	$25,000	12/11/89-12/10/90	N/A	Thermal-hydraulics
Stevenson & Associates	Eggenberger	89-002	$23,000	12/13/89-12/12/90	04/30/90	Seismic Engineering
System Plng. Corporation	Crawford	89-003	$80,000	12/14/89-12/13/90	04/15/90	Training/Qualificat.
Rizzo Ass.	Case	89-004	$35,000	12/14/89-12/13/90	04/30/90	Seismic Engineering
H & H Ass.	Eggenberger	89-005	$20,000	12/18/89-12/17/90	04/15/90	Seismic Engineering
Mitre	Thompson	89-006	$320,000	12/21/89-12/20/90	03/31/90	Standards
Apostolakis	Kouts	89-007	$ 5,000	02/07/90-02/06/91	04/30/90	Probabilistic Risk
Structural Integrity Ass.	Kouts	90-008	$12,500	02/06/90-02/05/91	04/30/90	System Piping
Dr. Schultz	Kouts	90-009	$25,000	02/01/90-01/31/91	05/01/90	Hanford Waste Tank
Brookhaven Nat. Lab.	Conway	90-010	$200,000	12/07/89-09/30/90	N/A	Piping Integrity
		TOTAL	$745,500			

March 21, 1990

Mr. Fazio's Questions for the Record
Energy and Water Hearings
Atomic Energy Defense Activities
March 13, 1990

Mr. Fazio. Now that the Administration has cancelled the Special Isotope Separation (SIS) plant in Idaho, a reflection of the fact that the U.S. has enough plutonium for weapons for the foreseeable future, why will the PUREX facility in Hanford, Washington continue to be operated, and why have other plutonium production-related activities not been eliminated from the FY 1991 budget?

Mr. Tuck. The decision not to construct the SIS facility at this time is a result of setting priorities to conform to the severe budget constraints imposed by the FY 1991 and anticipated subsequent budgets. While there is no need for the production of new plutonium in the foreseeable future, there remains a requirement for plutonium to meet weapons requirements. This will be accomplished through recovery of plutonium from processing previously irradiated targets, residue backlogs and weapons returns as well as the processing of currently generated residues at plutonium facilities across the complex. The Rocky Flats Plant is responsible for the majority of weapons recycle and residue processing activities, however, Nuclear Materials facilities at Los Alamos, Hanford and Savannah River Site will be used to supplement Rocky Flats Plant capabilities. Funding for all these facilities is required in the budget in FY 1991 and beyond.

Specifically in regard to the PUREX plant at Hanford, cleanout operations are scheduled for completion this month. After a planned outage to complete environmental compliance actions related to treatment of liquid effluent, a decision to resume operations is expected next December. Currently about *Deleted* of N Reactor irradiated spent fuel, approximately *Deleted* which contains weapon-grade material, is stored in two water-filled concrete basins at Hanford. Such storage was originally intended as an interim step toward reprocessing and recovery of nuclear material. Long-term storage in this mode was not envisioned and does pose an environmental risk due to deterioration of the spent fuel and the basins themselves. Operating PUREX to clean out the fuel storage basins would improve the safety posture at the site. The Department is investigating other means of dispensing with the irradiated spent reactor fuel. Preliminary studies indicate that processing through PUREX is the most cost effective means of dispensing with the fuel. OMB has directed that additional cost studies be completed before submission of the FY 1992 budget.

Mr. Fazio. Why, after a 25-year hiatus, will the DOE resume the production of highly enriched uranium (HE) metal for weapons at the Y-12 plant at Oak Ridge later this year? What weapons will the HEU be used in? Why not retire existing uranium-rich weapons, such as the W33 artillery shell, and postpone uranium metal production until a START treaty is signed, at which point additional HEU production will become unnecessary?

Mr. Tuck. The enriched uranium conversion facility and production of HEU metal at the Y-12 plant, Oak Ridge, will be resumed in the near future

Deleted

Additionally, the Department has historically provided HEU products, metals and oxides, to nonweapons users such as DOE and foreign research and test reactors. As a result of the inability to produce uranium metal in the past, the Department has had to provide this material from Defense Programs inventories. In view of projections that the inventories would be depleted to the point that additional HEU would have to be obtained, renovation at the Y-12 plant conversion facility was initiated in 1984. Startup of the facility is expected during FY 1991. Restart of the Y-12 uranium conversion facility is required

Deleted

Mr. Fazio. Why does the DOE lump all new warhead production in the "War Reserve, New Production" budget category, and not list individual warhead costs? Would you submit these costs for the record?

Mr. Tuck. The total "War Reserve New Production" costs are identified by individual warhead on page 77 of the Weapons Production and Surveillance budget. I submit for the record a copy of this page showing these costs. (The information follows:)

III. Activity Description (cont'd)

a. War Reserve New Production (cont'd)

The following table details War Reserve New Production direct expenses by weapon system:

Direct Expenses:	FY 1989	FY 1990	FY 1991
B61-3 Bomb		*Deleted*	
B61-4/10 Bomb			
W80-0 Sea Launched Cruise Missile			
W80-1 Air Launched Cruise Missile			
W82 155mm Artillery Fired Atomic Projectile			
B83 Bomb			
W87 PEACEKEEPER Warhead - Silo			
W88 TRIDENT II Warhead			
W89 Short Range Attack Missile II			
B90 Nuclear Depth/Strike Bomb			
Follow-on to Lance Missile			
Short Range Attack Missile Tactical			
Total Direct Costs	$ 356,878	$ 366,285	$ 374,212
Indirect Expenses	$ 561,213	$ 629,700	$ 726,085
Total War Reserve New Production, Operating	$ 918,091	$ 995,985	$1,100,297

NUCLEAR WARHEAD REQUIREMENTS

Mr. Fazio. In light of problems in the nuclear weapons production complex, is the DOE reevaluating its practice of producing a new warhead for each new delivery system? Are there existing warheads that could be used on new delivery systems instead of producing new warheads? Can the "plutonium pits" be recycled without refabrication into new weapons? For example:

- Could the W69 SRAM-A warhead be used on the SRAM-II missile instead of the new W89 warhead? Could the plutonium "pit" be used intact in the new SRAM-II missile warhead?
- Could the W76 Trident I warhead be used on the Trident II missile instead of the new W88 warhead?
- Could the B57 strike bomb/depth bomb warhead, or its "pit," be used on the Nuclear Depth/Strike Bomb instead of the new B90 warhead?
- Could the W85 Pershing II and W84 Ground-Launched Cruise Missile warheads be used on the Follow-on-to Lance (FOTL) and Short-Range Attack Missile-Tactical (SRAM-T) instead of producing new warheads for these systems?

Mr. Tuck. DOE is indeed reevaluating the practice of producing a new warhead for each new delivery system. We have recently completed a "Multiple Use Study" which evaluated repackaging, remanufacture, and reuse of existing resources. Each warhead is evaluated on a case-by-case basis as to the best path to follow. In all cases, plutonium resources are reused, ~~but~~ usually require reprocessing. There are several major points to be considered. *Deleted* *Deleted* A number of warheads in the stockpile do not use insensitive high explosive. Use of IHE for safety purposes in new warheads dictate *Deleted* *Deleted* The plutonium, therefore, has to be reprocessed *Deleted*

Deleted The SRAM-II warhead is one of the cases where inclusion of IHE is a prime driver. Electronics placed in old warheads is in many cases not being currently produced and has to be replaced. In some cases newer components can be used. In other cases a whole new circuit may have to be designed. The conclusion of both the Follow-on To Lance and Short Range Attack Missile - Tactical, Phase 2 Studies was that both the W85 and W84 warheads were too heavy for the systems and imposed severe range degradations. In the case of SRAM-T the missile would not even fly if the older warheads were used unchanged because of the size and weight mismatch. DOE has, however, selected a common warhead for both SRAM-T and FOTL to avoid producing a new warhead for each new system. The SRAM-T/FOTL uses existing and modified designs from the B61, W85, W88, and W89 even though existing hardware is not used.

Mr. Fazio. As nuclear warhead requirements decline in the future, describe how this budget category is expected to be reduced.

Mr. Tuck. First, it is not at all clear that nuclear warhead requirements will decline. True, arms control agreements may reduce the number of strategic or tactical nuclear weapons, but the requirements will not be reduced. In fact, the requirements of the military characteristics will likely increase. Indications from the DoD are that additional safety, security, use control, and use denial will be required in the future. From the DOE standpoint, it appears that reduced special nuclear material, reduced tritium usage, and reduced waste streams will be major considerations in future nuclear weapon designs and fabrications. Designs are becoming more enigmatic to accommodate the more stringent requirements which requires extensive use of test verified and validated computer codes. Fabrication considerations will become paramount in the future.

The cost of future nuclear systems is not likely to be reduced. Design costs are likely to increase due to military requirements. Fabrication cost of nuclear test units and production items are also likely to increase due to stricter requirements. As the older weapons and 'arms control' reduced weapons are decommissioned an additional expense will be incurred by the DOE complex. These increases will be offset to some degree by the reduced number of nuclear weapons fielded.

Mr. Fazio. How many warheads will the U.S. be obligated to retire under current START treaty counting rules? What will happen to these warheads? Will they be reused on other systems?

Mr. Tuck. The current START joint draft text, which limits a side's strategic arsenal to 1,600 delivery vehicles with 6,000 attributable warheads, does not obligate either side to retire warheads contained on systems removed from deployed status. U.S. retirement of warheads under the projected START treaty will depend on implementation of U.S. strategic force modernization plans as well as the forces we plan to retire under a START agreement. Currently, since there is considerable uncertainty in both of these matters, we cannot provide specifics as to our retirement plans under a START treaty. As to what will happen to the warheads, we do remove from missile systems being reduced, some will be used for modernization, some will be retained in storage, and some will be retired.

QUESTIONS ON THE ROCKY FLATS PLANT

Mr. Fazio. If the DOE is planning to move Rocky Flats in the future, why wait until sometime around 2015 to do this, while spending between $500-$600 million in the meantime to rebuild the plutonium recovery capability at the plant? If Rocky Flats is to be phased out, why not do so now?

Mr. Tuck. A decision to relocate the Rocky Flats plant has not been made at this time. The schedule and timing for any proposed relocation is also undetermined, but under the most optimistic scenario, it would take many years. The Plutonium Recovery Modification Project, PRMP, will provide a modern, criteria-compliant facility which lowers the risk to the worker, public and environment. In the longer term, PRMP will help eliminate stored residues, provide the capability to support weapons processing in a possible nuclear stockpile reduction situation, and will support the ultimate closure of Rocky Flats with decontamination and decommissioning of its facilities.

Building 771 and 776, which provide the current plutonium recovery for Rocky Flats, are non-compliant when compared against requirements for new facilities. They lack necessary capability to process certain residues, which results in a growing backlog. They have proven to be unreliable in support of production, with equipment available less than 25 percent of the time. Upgrades to the present facilities would cost roughly twice as much as PRMP, take longer to accomplish and cause 5 years lost processing. PRMP provides dramatic benefits in reducing risk as compared with continued operation of the existing outdated facilities. Modern technologies will reduce waste by 70 percent compared to the existing plant, and worker radiation exposure to less than half. Compliance with new DOE General Design Criteria, Order 6430.1A, requires that facilities have redundant, isolated and separated safety systems to provide protection similar to NRC commercial reactors.

PRMP provides capability to eliminate the backlog of residues on the plant site without cross-country shipping. Over 140 metric tons of residue in storage require processing. If there were a decision to relocate Rocky Flats functions to a new plant, extensive facility and site decommissioning and decontamination would be required. PRMP would provide the means to process the huge volume of residues, which would result from cleanup of plutonium buildings, while avoiding the higher public risk of shipping residues to another site.

Regardless of the future of Rocky Flats Plant or whether the nuclear arsenal grows or shrinks, PRMP is needed to provide safe and reliable plutonium processing in support of the DOE mission.

Mr. Fazio. Why is the target output capacity of the Plutonium Recovery Modification Project so high? The DOE construction data sheet state that "the annual target output capacity is approximately *Deleted* of foundry-grade plutonium metal." Is the DOE planning to use all of this capacity, which is enough to produce *Deleted* new nuclear warheads a year?

Mr. Tuck. The capacity of the Plutonium Recovery Modification Project, PRMP, is based on the site return design capacity of 3,300 kg per year, and processing of internally and foundry generated, and backlog residues. The plant capacity is adequate to support approximately *Deleted* per year. PRMP is designed so that all residues from any process in PRMP or other site plutonium operations can be processed, thus eliminating the practice of placing plutonium residues in drums for storage. Much of the PRMP workload is the processing of these recycled residues. The plutonium component manufacturing operations create plutonium residues which require processing. The amount of plutonium which enters the manufacturing foundry at the head end is far greater than the amount which leaves in completed weapons. The difference is plutonium residues resulting from the manufacturing process, which feed back into PRMP for reprocessing.

The PRMP is sized to be adequate to support the nuclear weapons stockpile plan under normal operating conditions, 2 shift, 5 days per week operation, with downtime for maintenance and periodic plutonium inventories. If the need for plutonium metal to the foundry drops, the PRMP can process greater amounts of backlog residues. Current weapons production requirements *Deleted* weapons deliveries in some years. PRMP capacity will also be needed to process weapons retired under various arms control scenarios.

Mr. Fazio. Has Rocky Flats begun shipping plutonium offsite to be reprocessed at the Savannah River Plant and the Los Alamos National Laboratory? What is the current and projected plutonium recovery capacity of these two facilities combined? Can this capacity replace the need for Building 371 at Rocky Flats?

Mr. Tuck. Rocky Flats has been shipping residues to the Savannah River Site and to the Los Alamos National Laboratory for more than five years. The current physical capacities of the plutonium processing facilities at SRS and

LANL are *Deleted* per year and *Deleted* per year, respectively. Capacities are highly dependent upon the ease of dissolution of the residue; the plutonium content of the residue; the need for maintenance and upgrading of processing equipment, which reduced the time available for processing; and the efficiency of the process the amount of secondary residue generated during processing. In actuality, these stated capacities can seldom be achieved for any extended period. During FY 1988 and FY 1989, LANL has averaged less than

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Therefore, LANL and SRS neither replace the output from the existing processing buildings at Rocky Flats, nor can they replace the need for Building 371.

Mr. Fazio. When is the Rocky Flats plant scheduled to restart plutonium recovery and pit production operations? At what date will plant closure begin to effect the initial operating capability of nuclear weapons?

Mr. Tuck. Plutonium recovery operations at the Rocky Flats plant are currently scheduled to resume in the second quarter of this calendar year and reach full operations by the third quarter of calendar year 1990. The next system scheduled to achieve initial operating capability--IOC-- *Deleted* *Deleted* A prolonged delay in resumption of plutonium operations at Rocky Flats could affect pre-production engineering in support of this IOC.

Mr. Fazio. What steps will the DOE take if Rocky Flats is not restarted as scheduled? Will it recycle entire warheads from retired weapons onto new ones, defer nuclear weapons production schedules, or recycle entire pits from old weapons onto new ones?

Mr. Tuck. If plutonium recovery and pit production operations at Rocky Flats do not resume as scheduled, any one or a combination of the above options could be necessitated.

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The DOE laboratories are currently investigating the possibilities of using pits from retired weapons in future systems. Deferral of production scheduled, as well as any of the above options, would have to be coordinated with the Department of Defense prior to implementation.

PLUTONIUM RECOVERY MODIFICATION PROJECT

Mr. Fazio. What are the most current plans for the Plutonium Recovery Modification project? How much will it cost? Construction? Total estimated cost (TEC)? When will it be completed? Has the DOE finalized its schedule for moving the Rocky Flats Plant? When will this take place?

Mr. Tuck. The construction portion of the Plutonium Recovery Modification Project is estimated to be $500 to $600 million. Total Project Cost is approximately $200 million higher and includes development costs and startup costs, items not included in the construction estimate. The project is scheduled to complete construction during the last quarter of FY 1996 with equipment and operational testing to follow. Processing operations are expected to start in FY 1997. Although a decision to relocate the Rocky Flats

Plant has not been made, it is expected that the design life of Plutonium Recovery Modification Project will be consistent with any proposed move.

Mr. Fazio. The Department has delayed, apparently by several months, the preparation of a new "revised" Nuclear Weapons Complex Modernization Study (2010 Report), which was to be presented to the Congress in April 1990. When can Congress expect to receive this important study? If this study has indeed been delayed by several months, what is the current planning basis for decisions regarding the future operations of the nuclear weapons production complex?

Mr. Tuck. A major review of the Nuclear Weapons Complex Modernization Study is being made with a report to the Secretary of Energy by August 1990. The report is expected to be sent to Congress later this year following a review by the Secretary and coordination with other appropriate agencies. The five-year plan being prepared as part of this review will be provided to Congress with the FY 1992 budget. A programmatic Environmental Impact Statement will be developed as a tool for consideration of the future operations of the nuclear weapons complex.

Mr. Fazio. The previous "2010 Study," completed during the final year of the Reagan Administration, called for the phaseout of Rocky Flats PLant production operations beginning around 1995, and for consolidation of these production operations at other DOE facilities (Idaho National Engineering Laboratory, Los Alamos National Laboratory and Savannah River Site). Is a phaseout of Rocky Flats Plant production operations still planned by the Department of Energy? If so, when will this phase out begin?

Mr. Tuck. The "2010 Study" recommended that action to relocate the production operations at Rocky Flats begin in 1995. The Modernization Review Committee is reviewing the basic assumptions and the recommendations of the Modernization Study. This includes the recommendation for the relocation of activities currently performed at the Rocky Flats Plant. In any case, should the recommendation to relocate be supported, the phaseout of operations at Rocky Flats will not take place until the activity has been replicated at a new site which will require many years.

Mr. Fazio. According to the news accounts, the Department has recently revised its plans for Building 371 renovation and restart. While the original plans was to renovate Building 371 itself, the new plan is apparently to use only a small portion of Building 371 and to build a new "annex" to Building 371 which will provide the majority of the new production area. Is the renovation of only a small part of Building 371 and construction of an annex the current DOE plan for new production facilities at the Rocky Flats Plant? What is the current total estimated cost for the Building 371 renovation/annex project? What is the estimated completion date for this project?

Mr. Tuck. The current DOE plan for Plutonium Recovery Modification Project includes construction of an annex to enlarge the available area in Building 371. The additional floor space is required to accommodate redundant safety class equipment required by the new DOE general design criteria. For minimum radiation exposure and maximum process efficiency most of the processes are being sited in the additional floor space. Building 371 currently is about 198,000 square feet. All but about 33,000 square feet will be used by PRMP. The total estimated cost of $500-600 million provides for design and construction/renovation of 165,000 square feet--83 percent--of Building 371 and the additional space to expand Building 371. The 33,000 square feet not used by PRMP would become available for drum storage in the near term and could be used for equipment to support decommissioning and decontamination of the plantsite in the future. The project is scheduled for construction completion in late FY 1996 with operational startup in FY 1997.

Mr. Fazio. Given that the Building 371 project will not be completed until the Rocky Flats production operations phaseout is well underway and that the project will cost a great deal of money, what is the Department's justification for proceeding with the project?

Mr. Tuck. The Plutonium Recovery Modification Project is scheduled for construction completion in FY 1996 and operational startup in FY 1997. A decision to relocate Rocky Flats has not been made at this time. If a decision was made to move Rocky Flats, site selection, environmental impact statement preparation, design, construction and startup would all be required prior to transfer of Rocky Flats activities. The Rocky Flats phaseout could not start until a new site was established, a process which would take many years. If there were a decision to relocate Rocky Flats functions to a new site, extensive facility and site decommissioning and decontamination would be required. PRMP would shift its mission to provide the means to process the volumes of D&D residues which would result from cleanup of plutonium buildings. This would provide the onsite capability for

D&D residue processing and avoid shipping the material to another site. Thus, PRMP would function for a good portion of its design life of 20 years even if the Rocky Flats Plant is relocated.

Regardless of the future of Rocky Flats Plant, PRMP is needed to improve the safety and reliability of plutonium processing in support of the DOE mission.

Statement of Richard W. Starostecki
Acting Deputy Assistant Secretary for Nuclear Materials
Department of Energy
FY 1991 Appropriation Hearings

Mr. Chairman and Members of the Committee: I am Richard W. Starostecki, Acting Deputy Assistant Secretary for Nuclear Materials, under the Assistant Secretary for Defense Programs of the U.S. Department of Energy (DOE). I appreciate this opportunity to provide testimony regarding the Department's Nuclear Materials Production program and its budget request for FY 1991.

The goals that form the basis of the FY 1991 budget request are those established by Secretary Watkins. Protecting the environment and ensuring the safety and health of workers and the public is our first priority and our greatest challenge. The nuclear materials complex must be operated to meet production requirements while achieving compatibility with our commitment to environment, safety and health programs.

THE STATE OF THE COMPLEX

This program mission is primarily accomplished through the operation of select facilities at five major sites: the Plutonium Uranium Extraction Plant (PUREX) and Plutonium Finishing Plant (PFP) facilities at Richland, Washington; the Feed Materials Production Center (FMPC) at Fernald, Ohio; the Idaho Chemical Processing Plant (ICPP) at the Idaho National Engineering Laboratory, Idaho Falls, Idaho; and numerous facilities at the Savannah River Site (SRS), Aiken, South Carolina. In addition, there are some important support functions performed at the Y-12 facility in Oak Ridge, Tennessee.

Most of the facilities in this complex are old and were built to the less stringent environmental and safety regulations of the 1950's and early 1960's. The complex has deteriorated through years of neglect and insufficient maintenance of plant and capital equipment and it is now viewed by many as a major threat to the environment and to safety and health. To meet near-term requirements, we are in the process of upgrading facilities and implementing new procedures at the SRS and at the ICPP to ensure maintenance of a safe, reliable, production capability. We are in a stage of transition. The highest priority is the restart of the Savannah River reactors to produce tritium. Plutonium is being obtained from the processing of scrap materials containing plutonium residues and the recycle of material from retired weapons.

THE MISSION

The Office of Nuclear Materials Production directs DOE's program to produce nuclear materials to meet national defense requirements. This mission will exist as long as the maintenance of a nuclear deterrent remains a keystone in the Nation's defense strategy. The principal nuclear materials required in support of the Nation's nuclear weapons arsenal are tritium, plutonium, and enriched uranium. Specific requirements for these materials are defined in the Nuclear Weapons Stockpile Memorandum (NWSM), updated and approved by the President annually. The requirements forecast in the stockpile memorandum are developed by the Department of Defense (DOD) in conjunction with DOE. In addition to providing nuclear materials for national defense, the Nuclear Materials Production program also produces and provides nuclear materials for use in Government research and development activities and in civilian research, commercial and medical applications. Spent fuels from the Navy's nuclear propulsion reactors and from research reactors are reprocessed, and the recovered uranium is recycled into DOE production reactors.

Historically, the Nuclear Materials Production program has been responsible for the production of new or virgin nuclear materials in N Reactor at Hanford, Washington and the Savannah River reactors in Aiken, South Carolina. The recycle of material and residues from retired weapons and the weapons manufacturing process was historically the responsibility of the Office of Military Application. However, in the mid-to-late 1980's, as plutonium residues from weapons production and recycle activities accumulated at the Rocky Flats Plant (RFP), excess capacity in Nuclear Materials Production facilities at SRS and Hanford was utilized to assist in reprocessing these materials. Also, reduced requirements for plutonium permitted the shutdown of N Reactor which had been producing weapon-grade plutonium. Current plutonium requirements can now be met totally through recycle of material from retired weapons and recovery from accumulated residues; therefore, no reactor production of plutonium has been planned for the foreseeable future. Consequently, the ability to meet the plutonium requirements is highly dependent on the operation of the RFP which is responsible for the majority of weapons recycle and residue processing activities.

The Nuclear Material Production plutonium facilities are now in a period of transition from supporting reactor plutonium production to supplementing the RFP weapons recycle and residue processing functions which are of insufficient capacity to meet currently identified needs. This transition involves phasing out plutonium processing at Hanford as existing materials on site are processed and adaptation of existing facilities at SRS to permit recycle of retired weapon materials and enhanced recovery of plutonium residues from the RFP. With cessation of virgin plutonium production and complete reliance on recycle and residue recovery, the Office of Nuclear Materials' role in plutonium supply, though essential, has diminished relative to that of the Office of Military Application and its RFP.

ENVIRONMENT, SAFETY AND HEALTH

As announced by the Secretary last June, the Department is aggressively pursuing a Ten-Point Plan intended to bring our facilities into full accountability and compliance with environmental, safety and health requirements.

Part of the Ten-Point Plan is the performance of independent "tiger team" reviews to be conducted at all Defense Programs' sites. The review of the FMPC has already been completed. The "tiger team" review, conducted during July and August 1989, found that that facility was not in full compliance with environmental regulations, had not kept pace with changing safety and health requirements, and had insufficient capability to ensure timely compliance with environmental, safety and health requirements. We have prepared an action plan to address all the "tiger team" findings for the FMPC. Our technical response and the implementation plan, containing detailed schedule data and resource requirements, has recently been submitted to the Secretary for approval. Some corrective actions have already been completed, some are well underway, and some will take several years to complete. At the current time, the nonreactor facilities at SRS are undergoing an intensive multi-team review that will extend through March 1990.

Another Ten-Point Plan initiative is the establishment by the Secretary of a new management team in Defense Programs. In that vein, and as reflected in the planned reorganization of the Office of the Assistant Secretary for Defense Programs, we are establishing a permanent technical staff of various disciplines. This staff will support line management in carrying out its responsibility to assess the adequacy of operations, existing designs and management control systems across the Defense Programs complex, not just at Nuclear Materials Production facilities. In this regard, line managers will have the capability to develop technical guidelines which satisfy existing and emerging DOE Orders, as well as to assure uniformity in providing consistent technical guides to our operation office managers who monitor the onsite activities on a day-to-day basis.

At this time I will proceed to discuss the details of our programs, covering current issues as well as the funding requested in the budget you have before you.

MATERIALS REQUIREMENTS

Tritium

The tritium in the weapons stockpile decays at the rate of about 5.5 percent per year. In order to maintain the effectiveness of the stockpile, the

tritium components are exchanged and recycled. In addition to this recycle work, the new weapons which replace retired weapons in the stockpile require tritium.

The SRS reactors are the Nation's sole source for production of tritium to meet the military needs of the DOD and the other government and civilian requirements. These reactors have not operated since April 1988 and therefore the demand for tritium is currently being met with existing inventories and DOD returns.

The attached chart shows the available tritium reserves from the beginning of October 1989 and as currently projected through September 1994. The chart shows the net available tritium on hand at SRS after satisfying the needs of the NWSM. The solid horizontal line labeled "minimum" represents the estimated minimum amount of pipeline inventory required to operate the tritium processing facilities. The complex has historically operated with a larger working inventory. The remaining two lines on this chart show the expected available tritium reserves under reactor scenarios of 1) no restart, and 2) a phased restart of the three reactors at three month intervals starting in October 1990, with subsequent operation at 50 percent of full power level. Each of these scenarios reflect requirements as projected in the

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Plutonium

This next chart shows the available plutonium reserves after satisfying the stockpile requirements. Much of the plutonium required for building new warheads is obtained by recovery and recycle of materials from retired weapons returned by the DOD to the DOE. The remaining plutonium demand, excluding the reserve, can be met by processing the previously produced weapon-grade plutonium, blending previously produced fuel-grade plutonium with existing inventories of high-purity plutonium, and recovery of plutonium from the backlog of nonspecification weapon-grade plutonium.

The projections in this chart are used as a management tool to focus attention on understanding why the curve is this shape. A further review of the situation reinforces the fact that plutonium demand and supply are highly dependent on resumption of operations at the RFP. Although the chart shows an increase in the available weapon-grade plutonium in later years, it demonstrates in the near term that even with a sufficient reserve of plutonium we are very dependent on our processing capacity to get it into the proper form for fabrication. This presumes DOE is capable of processing the scrap inventory to meet the chemical and isotopic specifications required for use in weapons and concurrently reducing the working inventories.

Enriched Uranium

I also need to mention the supply of highly enriched uranium for U.S. weapons. The U.S. weapons program has operated within its existing inventory of enriched uranium for the last 26 years without having to obtain additional material from the uranium enrichment complex. This has been accomplished by recovery and recycle of enriched uranium from retired warheads and using existing inventories.

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FY 1991 BUDGET OVERVIEW

For FY 1991, the total budget request for Nuclear Materials Production is $2.413 billion. This represents a 15 percent increase over the FY 1990 appropriation.

After inflation, SRS increases by $338.3 million. Funding for the Reactor Operations Management Plan, the reactor restart program, increases by about $150 million. Also, about $110 million in additional funding will be directed to necessary operational improvements to nonreactor facilities at the SRS. Finally, approximately $80 million will be required to maintain existing or new environmental, safety and health projects at SRS. Total funding requirements at other Nuclear Materials Production sites have decreased slightly from FY 1990 to FY 1991. I will now discuss the highlights of our funding requests at each of our major sites.

HANFORD

Funding for Hanford operations drops by about $10 million from the FY 1990 funding level to $219.9 million in FY 1991.

Efforts to place the N Reactor at Hanford in dry layup resumed in October 1989 and are expected to be completed by the end of FY 1990. Maintaining the N Reactor in a safe dry layup condition will cost about $40 million in FY 1991.

In preparation for an extended plant outage, the PUREX, is scheduled to complete limited operations intended to cleanout the facility in mid-March 1990. During the subsequent planned outage, provisions will be made to meet environmental compliance regulations for the discharge of liquid effluent. Future operation is contingent on completion of these upgrades. Our budget request assumes PUREX restart in December 1990 to conduct the processing of existing stockpiles of N Reactor irradiated spent fuel. A small portion of this stockpile is weapon-grade material and could be recovered in about 6 months of PUREX operation.

We are currently studying options for the processing of the remaining fuel grade N Reactor spent fuel as well as other spent nuclear fuels on the Hanford site. We are also initiating an environmental analysis of planned PUREX Plant operations to document changes in the environmental baseline, if any, established in the PUREX Environmental Impact Statement which was issued in 1983. Should this analysis identify deficiencies in the existing environmental documentation, we will initiate actions to assure full compliance with the requirements of the National Environmental Policy Act (NEPA).

The recovery and metal production facilities at the PFP at Hanford provide a capacity to recover plutonium from scrap and other process materials for conversion to plutonium metal. Approximately 300 kilograms of weapon-grade plutonium can be recovered at PFP on an annual basis. Although this is a limited capacity compared to capabilities at RFP and SRS, it does represent a capability we expect to maintain into the mid-1990's. In addition, the PFP facilities support site cleanup activities.

IDAHO CHEMICAL PROCESSING PLANT

Funding at the ICPP remains relatively constant, decreasing only from $228.2 million in FY 1990 to $226.2 million in FY 1991. This facility recovers useable uranium through reprocessing of spent fuel from the Navy's nuclear propulsion reactors. Subsequently, the recovered material is shipped for further processing at the Oak Ridge Y-12 facility and fabrication into fuel elements at SRS.

The modernization of the plant began with construction of the Fluorinel Dissolution and Fuel Storage Facility, which was initiated in the late 1970's. That facility replaced old, outdated, fuel storage capabilities and provided needed improvements to fuel dissolution capabilities.

Two major projects are currently underway and are continued through the FY 1991 budget: the Fuel Processing Restoration (FPR) and the Fire Protection Upgrade projects.

The ICPP was designed and built in the early 1950's to demonstrate fuel processing technologies and to support DOE's Nuclear Materials Production program. Over the plant's operating years, many modifications and additions have been made to provide a facility capable of safely meeting DOE's fuel receipt, handling, storage, and disposal requirements, was well as DOE's fuel processing needs. The FPR project will replace the last facility that was part of the original ICPP complex.

The FPR project will replace the originally installed uranium purification system with new modern facilities, thereby increasing reliability and enhancing the safety of these operations. The benefits to be achieved by completing this project are considerable: improvement of personnel safety by reducing radiation exposure, reduction of radioactive waste generation, compliance with today's more rigorous environmental protection standards, reduction of environmental discharges through recycle of process water and enhancement of criticality safety.

To correct the problems and conditions identified, the FPR project, with state-of-the-art engineering, would provide systems, facilities, and features that meet today's codes, standards, and requirement. Implementation of the FPR project is expected to yield significant savings in several areas, including: a reduction in personnel radiation exposures; a reduction in major plant shutdowns; a reduction in the volume of contaminated liquid wastes generated; and a substantial decrease in minor miscellaneous contamination incidents per year. The most recent ICPP average annual fuel receiving forecasts indicate ICPP's operating mission extending to at least the year 2028. The FPR project provides the necessary operating continuity and process reliability to ensure that the ICPP meets its improvement objectives and its defined operating mission.

A second project of significance is the Fire Protection Upgrade project. The improvements provided by this project are necessary to bring the ICPP into compliance with the DOE's fire protection orders and nationally recognized codes and standards. The scope of the project is based on the findings of a recently completed, independent evaluation of the plant's fire and life safety systems.

Y-12

The Y-12 Site at Oak Ridge plays a vital role in the Nuclear Materials Production program. Y-12 receives the ICPP enriched uranium oxide product and the enriched uranium oxide recovered from SRS reactor spent driver fuel. Y-12 then purifies and blends the material to the proper enrichment, converts the material to metal, and ships it to SRS for use in fabricating new driver fuel.

Currently, highly enriched uranium metal for weapons and other applications is provided from the DOE stockpile; however, replenishment of the stockpile is expected to be required *DELETED* Reestablishment of the capability to convert highly enriched uranium hexafluoride to uranium tetrafluoride, a key step in the production of metal from the product of the Portsmouth Gaseous Diffusion Enrichment Facility, is required to provide an adequate supply of metal. The operation of the new Enriched Uranium Conversion Facility at Y-12 will fulfill this function.

FEED MATERIALS PRODUCTION CENTER

Funding for the FMPC drops $34 million to a total of $90.6 million in FY 1991. This is principally due to the curtailment of planned construction projects, consistent with our intent to shut down the FMPC's depleted uranium production facilities.

Slightly enriched uranium operations were halted at FMP with the standdown of the Hanford N Reactor. Our objective is to phase out depleted uranium production operations at the FMPC in favor of procurement from the private sector. Depleted uranium production has been suspended since July 1989 to concentrate contractor efforts on safety improvements and site cleanup. Due to the suspension of operations at the FMPC, it has been necessary to accelerate the program of qualification of commercial depleted uranium sources. Depleted uranium production facilities will be maintained in standby at the FMPC pending the success of the vendor qualification program. We expect to finish the qualification process and issue a purchase order for delivery of depleted uranium in September 1990. About $12 million of the FMPC FY 1991 budget request is planned for delivery of depleted uranium purchases from qualified vendors beginning in October 1990.

Compliance with environmental, safety and health requirements is our primary current effort at Fernald. A Federal Facility Compliance Agreement is currently being renegotiated with the U.S. Environmental Protection Agency to establish milestones to bring the FMPC into compliance with environmental regulations. A consent decree is also being amended with the Ohio Environmental Protection Agency. The Sitewide Draft Environmental Impact Statement for Renovation and Site Evaluation is complete and is scheduled to be published shortly.

The Department is currently developing a strategy leading to phasing out the nuclear material production activities at the FMPC including plans for ensuring ultimate disposition of the materials currently onsite, achieving and maintaining compliance with regulatory requirements, and transition to remedial actions and decontamination and decommissioning activities.

SAVANNAH RIVER SITE

Funding for the SRS constitutes approximately 65 percent of the budget request for Nuclear Materials Production. A $383.7 million increase, equivalent to 32 percent, from FY 1990 to FY 1991 is needed to continue the activities initiated in FY 1989 and FY 1990.

The Secretary remains committed to resuming, as soon as possible, the safe production of tritium at SRS. Safe reliable tritium production at SRS is critical to the success of our production mission. In support of supplying tritium, funding is needed for reactor restart as well as for nonreactor facility improvements. Additionally, the SRS provides support to the DOD, National Aeronautics and Space Administration (NASA), and DOE through the manufacture, processing, and packaging of radioactive materials which are used as heat sources for generating electricity. Our primary focus at SRS is upgrading human performance and the management control systems. These areas were the underlying reasons for the deficiencies that resulted in the reactor shutdowns in 1988 and contributed to the deterioration in the equipment.

REACTOR RESTART

Since August of 1988, the production reactors at SRS have been in an extended outage during which safety concerns are being addressed. Four principle areas have been identified for improvement: design bases and system performance; human performance; management systems and practices; and DOE onsite technical vigilance and oversight.

The current plan calls for restart of the K Reactor during the fourth quarter of FY 1990 followed by the L and P Reactors respectively at 3-month intervals. There does remain some uncertainty in those plans making it impractical to announce a specific restart date. One example of a technical issue that contributes to the uncertainty is the ultrasonic testing, currently in progress, of the K Reactor vessel. The Secretary of Energy will not announce specific restart dates until after a thorough program review is conducted. This review is currently scheduled for April.

DOE's objective is to assure that the reactors can produce nuclear materials safely, reliably, and in a manner that protects the environment. Major improvements that will be made prior to the restart of any SRS reactor include: establishment of reactor power limits that assure that the capabilities of the Emergency Core Cooling Systems will not be exceeded in the event of a design basis Loss of Coolant Accident; verification of and improvements to the strength and integrity of the primary coolant system (including the reactor vessel); and considerably expanded training and knowledge requirements for reactor operations personnel.

To allow for public participation in the restart process and to further the purposes of the NEPA, DOE is preparing an Environmental Impact Statement.

To assure that the SRS reactors are ready to restart, DOE is conducting a safety evaluation, and we will issue a Safety Evaluation Report that documents the basis for DOE's evaluation.

NONREACTOR FACILITIES

A number of the SRS nonreactor facilities and operations are critical to the tritium production mission. They include: operation of fuel and target fabrication facilities, completion and operation of the Uranium Solidification Facility, operation of H canyon and the tritium extraction plant, and operations and upgrade of the power plant. Many of these SRS facilities are over 30 years old, designed and built to outdated environmental and safety standards. Production priorities in addition to funding constraints have often forced deferral of necessary expenditures for preventive maintenance, operational improvements, operator training, enhanced technical support, and improved incident analysis systems. The Department has begun to correct these known deficiencies. Priority for tritium in a resource limited environment requires that a slower pace be taken for improvements at the nonreactor facilities than for the reactors. Improvements in the human performance and conduct of operation areas are being implemented in a timely manner.

Reviews by the National Academy of Sciences of the reactors at the SRS were conducted in 1986 and 1987, and additional reviews by the Advisory Committee for Nuclear Facility Safety (Ahearne panel) revealed safety and health deficiencies that are now being corrected. During 1989, the National Academy of Sciences reviewed the nonreactor facilities at the SRS. As expected, their review of nonreactor facilities revealed similar health and safety deficiencies that are similarly being corrected.

The SRS has developed a preliminary nonreactor facility improvement plan. The scope includes: (1) development of an enhanced training program for nonreactor facility operators (fuel and target fabrication; plutonium, uranium, and tritium processing plants; power plants; and other supporting facilities); (2) initiation of an operational improvement program to enhance performance at all nonreactor facilities, including radiological protection, safety analysis review upgrades, safety appraisal development and physical security improvements; and (3) increased environmental, safety, health and quality assurance activities related to performance guidelines, human performance, management systems, and facility improvements. We have reviewed the plan, identified some gaps and met with the contractor to ensure a full understanding of the needed corrective action. We view the plan as dynamic, most of the preliminary elements are needed and as further reviews are completed additional elements will be identified. For example, the need to promote line management accountability at each individual facility is still being addressed. Similarly, an integrated approach to operational safety should include the responsibility for radiation safety and protection at the level of plant manager. The contractor recognizes these gaps in the current plan and is preparing to supplement it.

NUCLEAR MATERIALS FOR NON-WEAPON USE

Radioisotope Thermoelectric generators (RTGs) produce electricity from heat through the application of radioactive materials. The RTGs are the enabling technology for a wide range of NASA deep space and planetary exploration missions, and for DOE national security missions. A form of plutonium referred to as plutonium-238 is the optimum fuel for powering RTGs. Plutonium-238 requirements have been identified by the Department, the Navy, and NASA. For the near-term, the Department plans to rely on the current inventory of plutonium-238 at the SRS. This inventory will be blended at the SRS to meet user specifications so as to extend the supply as long as possible. For the long-term, production of new plutonium-238 in the SRS production reactors is required to meet the needs of current firm missions. Activities that must be completed include: completion of a plutonium-238 blend program to recover available material; production of neptunium-237 in HB-line; fabrication of neptunium-237 into reactor targets; reactor irradiation; and processing in H canyon, HB-line and the Plutonium Fuel Form Fabrication facility.

SPECIAL ISOTOPE SEPARATION

Current budget constraints have forced the Department to reevaluate its decision to proceed with the construction of the SIS facility in Idaho. Accordingly, the Department has not requested construction funding in FY 1991. Phaseout of the construction project is proposed to begin on April 1, 1990 and

be completed during FY 1990. The decision by the Department not to construct the SIS facility at this time is based on a reassessment of the Department's priorities in order to conform to the budget constraints imposed by the FY 1991 and anticipated future budgets.

The SIS facility would have provided the Department with an additional source of weapon-grade plutonium as a contingency to meet any future identified needs for this material. In order to preserve a viable option for future deployment of this contingency, the Department proposes to complete the development of the SIS technology at the Lawrence Livermore National Laboratory in California. This plan calls for the use of nonhazardous surrogate materials in the Engineering Demonstration Facility, in lieu of plutonium. These tests will resume subject to completion of appropriate NEPA requirements.

This research and development effort is scheduled to conclude in FY 1991 and will require $66 million in FY 1991. The Department anticipates no additional program funding beyond FY 1991 and a maximum of $25 million in potential deferred outyear closeout costs.

The Administration is proposing an expedited, but orderly, closeout of the SIS Production Facility Project (86-D-148), which had been slated for construction in Idaho. We are requesting no construction funds for FY 1991 and will commence closeout activities as soon as Congress approves the necessary reprogramming of SIS funds as part of the Department's Omnibus FY 1990 reprogramming action. We anticipate being able to save $14.4 million from

FY 1990 project funding, presuming closeout of this project is approved by April 1, 1990.

The Secretary has recognized that there are potential alternate applications for the Atomic Vapor Laser Isotope Separation (AVLIS) technology beyond those being developed by DOE and has initiated a study by the National Academy of Science to identify the most promising of these. Potential alternate applications include such areas as: reduction or minimization of nuclear waste, improving the purity and quality of materials for the electronics industry, laser and optics technology applied to various communications and electronics applications, etc. The potential spinoffs of DOE development of the AVLIS process could have ramifications in the modernization of commercial industry and in the accomplishment of future defense missions.

By bringing the research and development program in an orderly and logical conclusion as proposed, the Department will be positioned to promptly deploy this capability should that need arise in the future. This course of action should provide a sufficient technology base. Continued SIS research and development will also place the Department in a better position to study the alternate applications of this technology and to transfer elements of the technology to users throughout the defense complex and possibly to the private sector as well.

MAINTENANCE

I have just outlined the major activities we are undertaking through FY 1991. These activities represent a comprehensive program to bring existing facilities in line with current environmental, safety and health regulations and expectations. Once upgrade actions are accomplished, we face the challenge of maintaining our facilities to established standards and responding to changes to these standards in a timely manner. Although there are many factors important to meeting this challenge, maintenance is critical to our success. As I have mentioned before, the Department has neglected its maintenance program. This is not unlike the situation that existed in the commercial sector prior to the accident at Three Mile Island. It is always easy in times of fiscal constraint to espouse the concept "don't fix it till it breaks". We must strongly support future funding for maintenance and not allow fiscal pressures to undermine all we have and will accomplish.

Effective maintenance programs will be developed and implemented for all facilities in the nuclear materials complex, not just the reactors. These programs will be built on a thorough knowledge of facility designs, a comprehensive understanding of why the particular characteristics of each design were chosen, and the careful review of the analyses and testing employed to demonstrate compliance with those design requirements. This body of engineering data will provide the basis for establishment of safe operating limits, as well as the underpinning for preventive and predictive maintenance programs to assure the preservation of adequate safety margins throughout remaining plant lifetime. Surveillance testing as an integral part of the maintenance programs will monitor actual performance of structures, systems, and components. Comparison of actual to required performance will be utilized to identify remaining margins and provide early warning of potential infringement upon safe operating limits.

PROGRAM OVERSIGHT

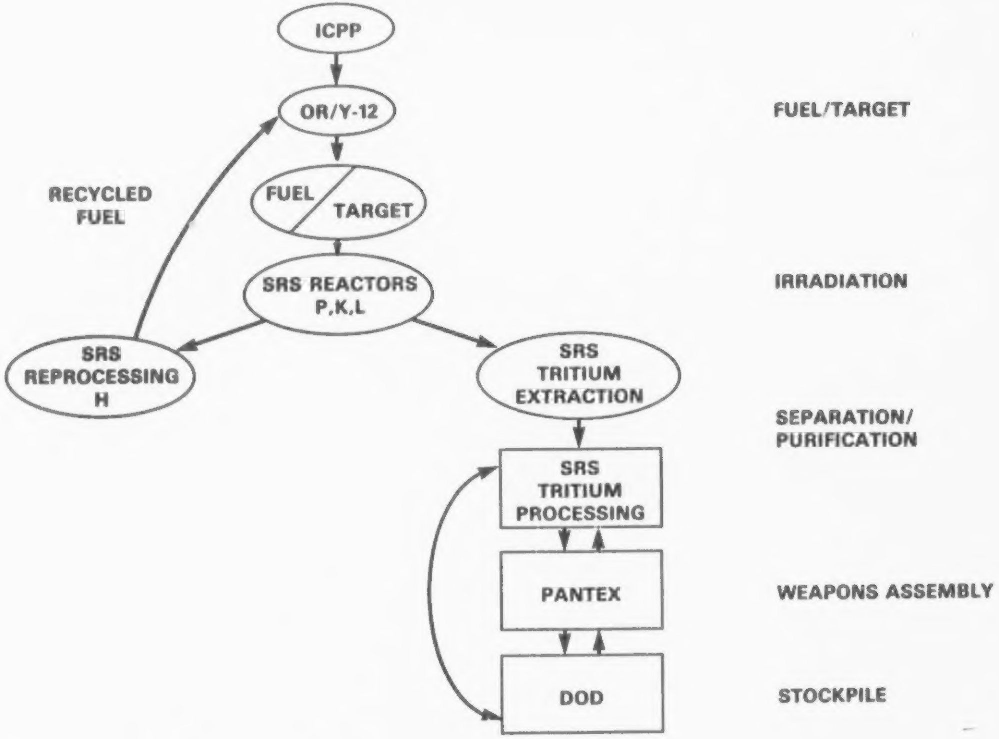
One of the most serious management issues facing the Department is the lack of sufficiently qualified and trained technical personnel who have a firm underpinning in the areas of environment, safety and health--the very people needed to make the system work. For the career federal employee, there does not currently exist within DOE, a professional career development program that teaches, trains, and develops personnel for the highly important and increasingly complicated task of managing environment, safety, health and production at facilities as varied and complicated as those in the nuclear weapons complex. In a world in which "you get what you pay for," there are many obstacles (noncompetitive salaries, constraining conflict-of-interest laws, etc.) impeding the Department from attracting, training, and retaining adequate numbers of able managers. There continues to be a problem of recruiting highly competent technical personnel with the necessary experience; to help overcome this problem in the future, an aggressive recruiting and training program oriented toward recent college graduates is planned.

SUMMARY

Our commitment to environmentally sound and safe operations is unshakable. Public confidence in our ability to conduct environmentally acceptable and safe operations to achieve our production mission must be based on demonstrated performance. To this end we are working toward a program of full compliance with the Secretary's initiatives regarding NEPA and nuclear safety. In order to be true to this commitment and still accomplish our mission of supplying nuclear materials for defense and other purposes, our FY 1991 budget requirements, as shown on this final chart, are essential.

UNCLASSIFIED

TRITIUM



ICPP

OR/Y-12

FUEL / TARGET

SRS REACTORS
P,K,L

SRS
REPROCESSING
H

RECYCLED
FUEL

SRS
TRITIUM
EXTRACTION

SRS
TRITIUM
PROCESSING

PANTEX

DOD

FUEL/TARGET

IRRADIATION

SEPARATION/
PURIFICATION

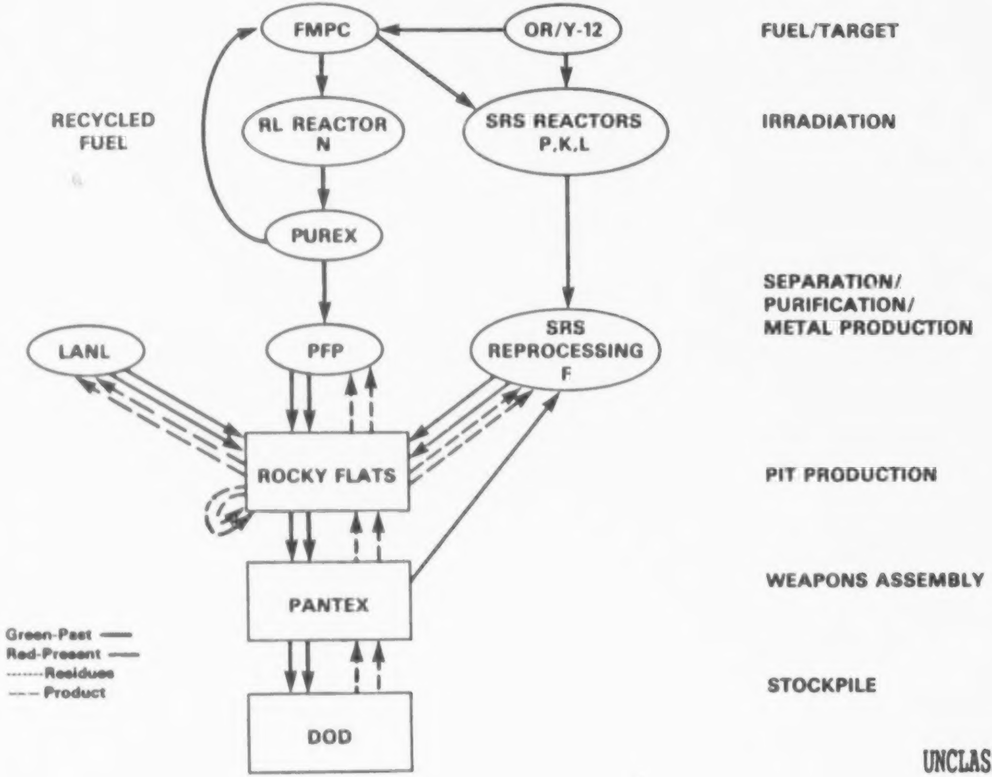
WEAPONS ASSEMBLY

STOCKPILE

UNCLASSIFIED

UNCLASSIFIED

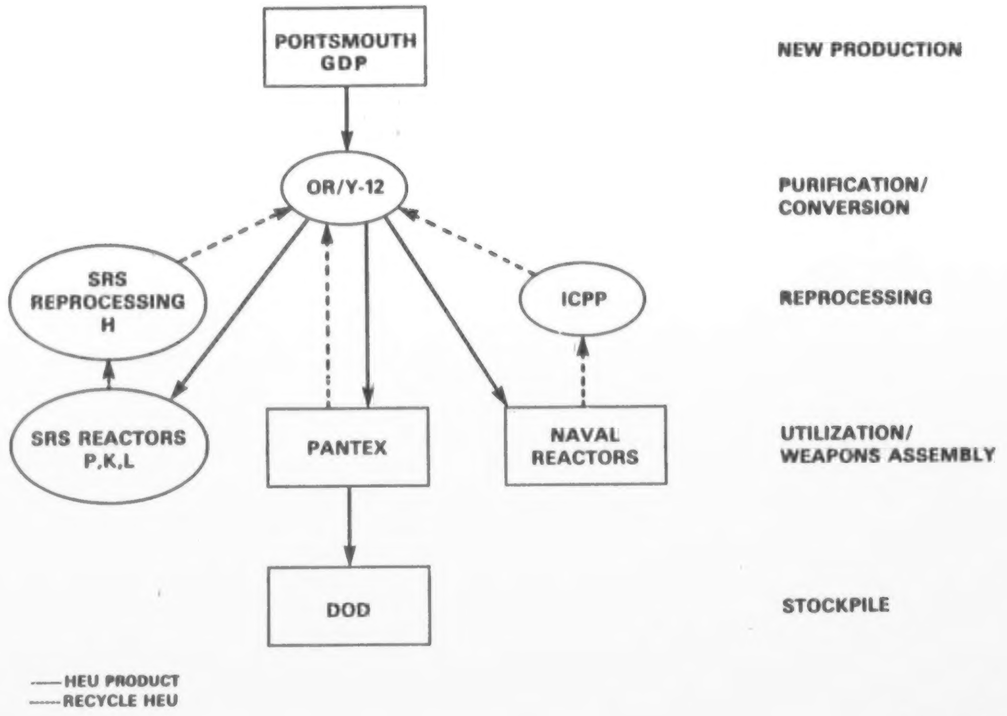
PLUTONIUM


FMPC
OR/Y-12
FUEL/TARGET
RECYCLED FUEL
RL REACTOR N
SRS REACTORS P,K,L
IRRADIATION
PUREX
SEPARATION/ PURIFICATION/ METAL PRODUCTION
LANL
PFP
SRS REPROCESSING F
ROCKY FLATS
PIT PRODUCTION
PANTEX
WEAPONS ASSEMBLY
Green-Past ——
Red-Present ——
-------Residues
--- Product
DOD
STOCKPILE

UNCLASSIFIED

UNCLASSIFIED

ENRICHED URANIUM


PORTSMOUTH GDP
NEW PRODUCTION
OR/Y-12
PURIFICATION/ CONVERSION
SRS REPROCESSING H
ICPP
REPROCESSING
SRS REACTORS P,K,L
PANTEX
NAVAL REACTORS
UTILIZATION/ WEAPONS ASSEMBLY
DOD
STOCKPILE
—— HEU PRODUCT
------ RECYCLE HEU

UNCLASSIFIED

DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

HANFORD OPERATIONS

N REACTOR

O DRY LAYUP WILL BE COMPLETED BY END OF FY 1990

PUREX

O EXTENDED PLANT OUTAGE PLANNED AFTER COMPLETION OF CURRENT CAMPAIGN IN MID-MARCH

O DURING OUTAGE ENVIRONMENTAL UPGRADES TO HANDLE EFFLUENT STREAMS FROM THE PLANT AND THE 242-A EVAPORATOR WILL BE PERFORMED

O OPERATIONS ARE EXPECTED TO RESUME IN DECEMBER 1990

DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

HANFORD OPERATIONS

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES	$ 235.0	$ 209.8	$ 199.9
CAPITAL EQUIPMENT	13.7	12.7	9.3
CONSTRUCTION			
GENERAL PLANT PROJECTS	5.9	4.2	4.4
90-D-143 PFP FIRE SAFETY	0	.8	2.5
86-D-149 PROD. RETENTION	0	2.1	3.8
TOTAL CONSTRUCTION	5.9	7.1	10.7
TOTAL	$ 254.6	$ 229.6	$ 219.9

UNCLASSIFIED

DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

IDAHO CHEMICAL PROCESSING PLANT

- MODERNIZATION OF ICPP BEGAN WITH CONSTRUCTION OF FAST FACILITY
- TWO MAJOR PROJECTS ARE UNDERWAY
- FUEL PROCESSING RESTORATION
  - IMPROVES PERSONNEL SAFETY BY REDUCING RADIATION EXPOSURE
  - REDUCES RADIOACTIVE WASTE GENERATION
  - REPLACES AGING PLANT WITH NEW MODERN FACILITY INCREASING RELIABILITY
  - COMPLIES WITH TODAY'S MORE RIGOROUS ENVIRONMENTAL PROTECTION STANDARDS
  - REDUCES ENVIRONMENTAL DISCHARGES THROUGH RECYCLE OF PROCESS WATER
  - PROVIDES ENHANCEMENTS TO CRITICALITY SAFETY
  - CONSTRUCTION IS ON-GOING
- ICPP FIRE PROTECTION
  - CORRECTS LIFE SAFETY AND FIRE PROTECTION DEFICIENCIES IDENTIFIED BY INDEPENDENT STUDIES
  - DESIGN INITIATED

UNCLASSIFIED

DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

IDAHO CHEMICAL PROCESSING PLANT

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES	$ 99.0	$ 105.3	$ 119.2
CAPITAL EQUIPMENT	7.0	8.5	8.0
CONSTRUCTION			
GENERAL PLANT PROJECTS	3.8	7.2	5.5
90-D-141 FIRE PROTECTION UPGRADE	0	3.5	6.0
86-D-148 SIS PROD. PLANT	17.0	29.8	0
85-D-139 FUEL PROCESSING RESTORATION	50.1	73.9	87.5
TOTAL CONSTRUCTION	70.9	114.4	99.0
TOTAL	$ 176.9	$ 228.2	$ 226.2

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

Y-12

- PROVIDES THE HIGH ENRICHED URANIUM METAL FOR SAVANNAH RIVER SITE (SRS)
  - PROCESSES AND RECYCLES URANIUM PRODUCT FROM IDAHO CHEMICAL PROCESSING PLANT AND SRS FOR USE AS FUEL IN REACTORS
  - PROVIDES FOR STARTUP AND OPERATION OF ENRICHED URANIUM CONVERSION FACILITY
  - PROVIDES PROJECT SUPPORT FOR SRS EFFORTS TO CONVERT URANYL NITRATE TO OXIDE FOR SAFETY CONCERNS
- PROCESSES DOE GENERATED URANIUM SCRAP AS THE DESIGNATED CENTRAL SCRAP MANAGEMENT OFFICE
- SUPPORTS QUALIFICATION OF COMMERCIAL VENDOR TO FABRICATE DEPLETED URANIUM METAL FOR WEAPONS PROGRAM

UNCLASSIFIED

DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 ,CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

Y-12

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES	$ 13.3	$ 16.8	$ 14.5
CAPITAL EQUIPMENT	1.7	2.2	3.1
CONSTRUCTION GENERAL PLANT PROJECTS	0	0	2.1
TOTAL	$ 15.0	$ 19.0	$ 19.7

UNCLASSIFIED

DEFENSE PROGRAMS — NUCLEAR MATERIALS

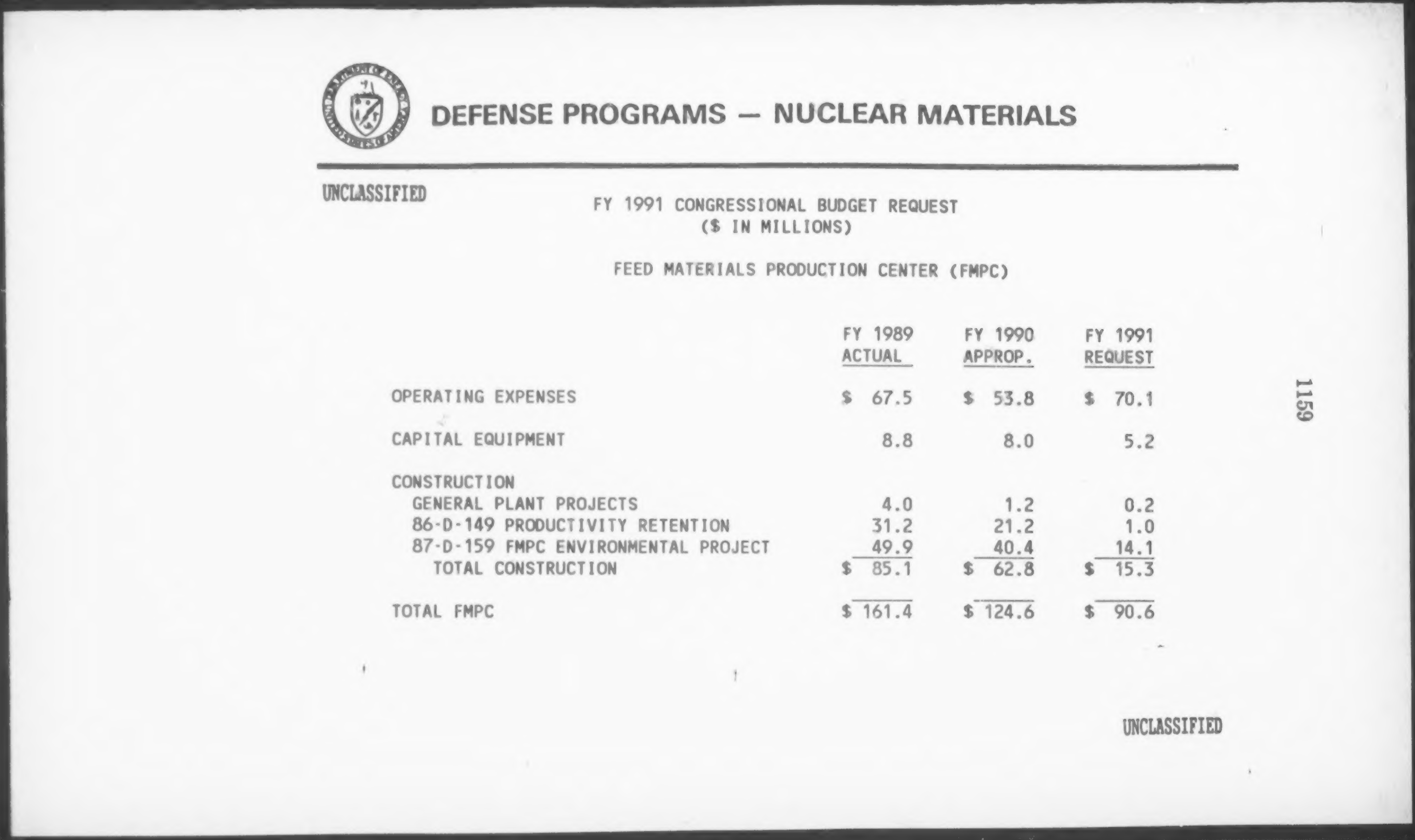
UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

FEED MATERIALS PRODUCTION CENTER

- O PRODUCTION HAS BEEN SUSPENDED TO CONCENTRATE ON CLEANUP AND WASTE MANAGEMENT
- O TIGER TEAM REVIEW COMPLETED 8/89
  - IMPLEMENTATION PLAN RECEIVED 2/90
- O VENDOR QUALIFICATION FOR DU UNDERWAY
  - NEAR-TERM SOURCE MAY BE AVAILABLE BY SEPTEMBER 1990
  - SR DIRECTED TO DEVELOP PLANS FOR REACTOR PU TARGET SOURCE
- O EVEN WITH PLANS TO CEASE PRODUCTION, FUNDING FOR CLOSEOUT IS REQUIRED FOR FORESEEABLE FUTURE

UNCLASSIFIED



DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

FEED MATERIALS PRODUCTION CENTER (FMPC)

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES	$ 67.5	$ 53.8	$ 70.1
CAPITAL EQUIPMENT	8.8	8.0	5.2
CONSTRUCTION			
GENERAL PLANT PROJECTS	4.0	1.2	0.2
86-D-149 PRODUCTIVITY RETENTION	31.2	21.2	1.0
87-D-159 FMPC ENVIRONMENTAL PROJECT	49.9	40.4	14.1
TOTAL CONSTRUCTION	$ 85.1	$ 62.8	$ 15.3
TOTAL FMPC	$ 161.4	$ 124.6	$ 90.6

UNCLASSIFIED

DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

SAVANNAH RIVER SITE (SRS) - MISSION

- TRITIUM PRODUCTION IS HIGHEST PRIORITY OF SRS
- REACTOR RESTART WILL CONTINUE BASED ON REACTOR OPERATIONS MANAGEMENT PLAN
- NONREACTOR FACILITY IMPROVEMENTS WILL BE FOCUSED TO SUPPORT REACTOR FACILITIES
- SRS WILL SUPPORT REQUIREMENTS FOR PU-238 FOR IMMEDIATE FUTURE
- FOCUS WILL BE ON UPGRADING HUMAN PERFORMANCE AND MANAGEMENT CONTROL SYSTEMS

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

O SAFETY UPGRADES ARE REQUIRED FOR ALL THREE SAVANNAH RIVER REACTORS

O FOUR PRINCIPAL AREAS OF IMPROVEMENT IDENTIFIED:

- DESIGN BASES AND SYSTEMS PERFORMANCE
- HUMAN PERFORMANCE
- MANAGEMENT SYSTEMS AND PRACTICES
- DOE ONSITE TECHNICAL VIGILANCE

O FOCUS IS ON ASSURING SAFETY, RELIABILITY, AND PROTECTION OF THE ENVIRONMENT

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

REACTOR RESTART

- O TENTATIVE SCHEDULE FOR RESTART
  - K REACTOR - 4TH QUARTER, FY 1990
  - L REACTOR - 1ST QUARTER, FY 1991
  - P REACTOR - 2ND QUARTER, FY 1991
- O EXPECT TO FINALIZE STARTUP DATES APRIL 1990

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

REACTOR RESTART (CONT'D.)

O INCLUDES ALL ACTIVITIES REQUIRED TO ASSURE THAT K, L, AND P REACTORS AT SAVANNAH RIVER:

  - CAN RESTART IN A TIMELY MANNER
  - CAN CONTINUE TO OPERATE IN AN ENVIRONMENTALLY ACCEPTABLE, SAFE, AND RELIABLE MANNER
  - CAN PRODUCE NUCLEAR MATERIALS SPECIFIED IN THE NUCLEAR WEAPONS STOCKPILE MEMORANDUM (NWSM)

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
SAVANNAH RIVER SITE

IMPROVEMENTS TO NONREACTOR OPERATIONS ARE
CRITICAL TO OUR ABILITY TO PROVIDE MATERIAL

O FACILITIES ARE REQUIRED IN ADDITION TO REACTORS

- FUEL AND TARGET FABRICATION FACILITY OPERATION
- COMPLETION AND OPERATION OF FUEL PRODUCTION FACILITY
- H CANYON EFFLUENT TREATMENT FACILITY OPERATION (EM FUNDED)
- HIGH LEVEL WASTE TANKS AND EVAPORATORS (EM FUNDED)

O MAJOR ELEMENTS OF NONREACTOR IMPROVEMENTS PLAN

- PERFORMANCE GUIDELINES
- HUMAN PERFORMANCE
- MANAGEMENT SYSTEMS
- TRAINING
- FACILITY IMPROVEMENTS

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

SAVANNAH RIVER SITE - PU-238 PRODUCTION

- O PU-238 REQUIREMENTS HAVE BEFN IDENTIFIED FOR NAVY, NASA, AND THE DOE
- O THE DEPARTMENT RECENTLY MADE A DECISION TO PRODUCE THIS MATERIAL AT THE SRS
- O ACTIVITIES WHICH MUST BE COMPLETED AT SRS INCLUDE:
  - COMPLETION OF PU-238 BLEND PROGRAM TO RECOVER AVAILABLE MATERIAL
  - PRODUCTION OF NP-237 IN HB LINE
  - FABRICATION OF NP-237 INTO REACTOR TARGETS
  - REACTOR IRRADIATION
  - PROCESSING IN H CANYON, HB-LINE AND PUFF

UNCLASSIFIED

DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

SAVANNAH RIVER SITE

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES			
NMP	$ 499.2	$ 498.1	$ 629.2
REACTOR OPERATIONS MANAGEMENT PLAN	358.6	499.1	652.6
TOTAL OPERATING EXPENSES	857.8	997.2	1,281.8
CAPITAL EQUIPMENT	62.2	66.0	77.8
CONSTRUCTION			
GENERAL PLANT PROJECTS	15.0	16.7	24.5
90-D-150 REACTOR SAFETY ASSURANCE	0	12.5	32.6
90-D-149 PLANTWIDE FIRE PROTECTION	0	4.8	49.1
86-D-149 PRODUCTIVITY RETENTION	43.5	57.3	57.0
ALL OTHER	61.2	39.5	54.9
TOTAL CONSTRUCTION	119.7	130.8	218.1
TOTAL SAVANNAH RIVER SITE	$1,039.7	$1,194.0	$1,577.7

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST

SPECIAL ISOTOPE SEPARATION

- FY 1989 - EIS RECORD OF DECISION, INTEGRATED TEST RUNS WITH SURROGATE MATERIALS IN ENGINEERING DEMONSTRATION FACILITY (EDS) AT LAWRENCE LIVERMORE NATIONAL LABORATORY
- FY 1990 - CONSTRUCTION PROJECT (86-D-148) CLOSEOUT, ENVIRONMENTAL ASSESSMENT (EA) FOR RESUMPTION OF SURROGATE TESTS IN EDS, INITIATE INDEPENDENT STUDY OF ALTERNATE APPLICATIONS OF AVLIS TECHNOLOGY BY NATIONAL ACADEMY OF SCIENCES
- FY 1991 - COMPLETE SURROGATE TESTING IN EDS, CONCLUDE AND DOCUMENT DEVELOPMENT PROGRAM, COMPLETE INDEPENDENT STUDY OF ALTERNATE APPLICATIONS OF AVLIS TECHNOLOGY

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

SPECIAL ISOTOPE SEPARATION

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES	$ 78.0	$ 75.4	$ 66.5
CAPITAL EQUIPMENT	0.4	2.4	0
GPP	0.6	1.8	0
CONSTRUCTION	23.0	39.4	0
TOTAL	$ 102.0	$ 119.0	$ 66.5

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
NUCLEAR MATERIALS PRODUCTION	$1,942.7	$2,092.3 A/	$2,413.0
		+8%	+15%

A/ REFLECTS $135 MILLION APPROPRIATION TRANSFER FROM THE DEPARTMENT OF DEFENSE, PURSUANT TO THE NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEARS 1990-1991, P.L. 101-189.

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
CHANGES FROM FY 1990 APPROPRIATION
($ IN MILLIONS)

FY 1990 APPROPRIATION	$2,092.3
O INFLATION	+75.4
O SAVANNAH RIVER	+338.3
O SPECIAL ISOTOPE SEPARATION	-55.9
O ALL OTHER ACTIVITIES	-37.1
TOTAL FY 1991 REQUEST	$2,413.0

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN MILLIONS)

	FY 1989 ACTUAL	FY 1990 APPROP.	FY 1991 REQUEST
OPERATING EXPENSES:			
REACTOR OPERATIONS	$ 620.0	$ 686.1	$ 811.5
PROCESSING	399.6	467.9	562.5
SPECIAL ISOTOPE SEPARATION	78.0	75.4	66.5
SUPPORTING SERVICES	258.0	232.7	302.0
PROGRAM DIRECTION	32.4	34.7	42.5
ENRICHED MATERIAL	169.0	166.4	176.9
SUBTOTAL, OPERATING EXPENSES	$1,557.0	$1,663.2	$1,961.9
CAPITAL EQUIPMENT	96.3	100.5	105.6
CONSTRUCTION	289.4	328.6	345.5
TOTAL REQUEST	$1,942.7	$2,092.3	$2,413.0

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DEFENSE PROGRAMS — NUCLEAR MATERIALS

UNCLASSIFIED

FY 1991 CONGRESSIONAL BUDGET REQUEST
($ IN THOUSANDS)

PROGRAM DIRECTION

	FY 1989 ACTUAL		FY 1990 APPROP.		FY 1991 REQUEST	
	DOLLARS	FTE'S	DOLLARS	FTE'S	DOLLARS	FTE'S
IDAHO	$ 655	10	$ 886	13	$ 1,000	14
OAK RIDGE	0	0 A/	0	0 A/	1,400	20
RICHLAND	0	0 A/	0	0 A/	2,500	29
SAVANNAH RIVER	28,433	351	30,166	342	29,000	342
HEADQUARTERS	3,315	47	3,684	53	8,600	121
TOTAL REQUEST	$32,403	408	$34,736	408	$42,500	526

A/ PERSONNEL FUNDED IN FY 1989/1990 BY THE OFFICE OF MANAGEMENT AND ADMINISTRATION.

UNCLASSIFIED

Department of Energy
Washington, DC 20585

RICHARD W. STAROSTECKI

Mr. Richard Starostecki has over 20 years experience with the Navy, the Government, and private industry dealing with nuclear reactors and fuel cycle facilities. He joined the Department of Energy in December 1987 as the Deputy Assistant Secretary for Safety, Health and Quality Assurance. In this capacity, he managed the Department's safety and health oversight programs for over 260 nuclear facilities and 160 nonnuclear facilities.

Subsequently, in November 1989, he was detailed to the Office of Defense Programs to be the Acting Deputy Assistant Secretary for Nuclear Materials. He has had 12 years of experience with the Nuclear Regulatory Commission in progressively more responsible positions in both Headquarters and a regional office. Starting with the regulatory staff of the Atomic Energy Commission in 1972, he has been involved in licensing of nuclear reactors and environmental and regulatory oversight of the back end of the nuclear fuel cycle. For 5 years, he was in a field position overseeing construction and operation of over 30 power reactors. He directed and implemented a 55-person-resident-inspector effort at 17 sites, the regional operator licensing program, and managed the regional diagnostic assessment program for 17 different utilities. After serving as the Deputy Director, Office of Inspection and Enforcement, he assumed the position of Associate Director for Inspection and Technical Assessment within a newly reorganized Office of Nuclear Reactor Regulation. He directed the transition of over 350 technical staff from 3 different organizations to focus on operational reactor safety.

Mr. Starostecki was also a manager for 3 years with a high technology consulting firm providing services in the area of high-level waste, nonproliferation policies, and technology assessments to Government agencies and national laboratories. Prior to joining Federal service, he was in the nuclear Navy where he served aboard an operational submarine and also was an instructor and supervisor at the Navy's nuclear power school.

Mr. Starostecki has a B.S. with merit from the U.S. Naval Academy, where he majored in mechanical engineering and ship propulsion. In addition to completing the Navy's nuclear power program, he has completed graduate studies in Economics at the University of Delaware and Georgetown University.

STATEMENT OF
DR. DOMINIC J. MONETTA
DIRECTOR, OFFICE OF NEW PRODUCTION REACTORS
DEPARTMENT OF ENERGY
FY 1991 APPROPRIATIONS HEARINGS
MARCH 13, 1990

Mr. Chairman and members of the Committee, I am pleased to appear before you today to present an overview of the status of the New Production Reactors Program and our budget request for FY 1991. The mission of our program is clear: to design and construct new production reactor capacity for an assured supply of nuclear materials, primarily tritium, to maintain the Nation's nuclear deterrent capability.

With the support of the Congress, we have embarked upon a course of action to ensure that these nuclear materials will be reliably produced in a safe, secure, and environmentally sound manner and in adequate amounts to meet national security requirements. This is both a necessary and ambitious endeavor, and we must make certain that our national security policies are not undermined and that all future defense policy options remain open.

To accomplish this mission, the Department's preferred strategy is to proceed with the design and construction of a Heavy Water Reactor (HWR) at the Savannah River Site and to design and construct a Modular High-Temperature Gas-Cooled Reactor (MHTGR) at the Idaho National Engineering Laboratory. As a contingency, work is to continue on the development of a Light Water Reactor (LWR) tritium target.

This strategy fully embraces the concept of duality -- using two different technologies at two different sites -- which will provide the highest assurance of reliable supplies of tritium. It is imperative that this vital concept of duality remains because it is the cornerstone of our strategy for providing assurance of production capacity for the future.

Until the final EIS and subsequent Record of Decision are issued in late 1991, the Department of Energy (DOE) will still consider all reasonable options concerning replacement production capacity. However, DOE still strongly supports the preferred strategy and will continue to pursue it on an expeditious schedule. Certainly we all endorse the prospects for peace that are sweeping our world today, but preparedness should remain as our watchword. As Secretary Watkins has stated, "Flexibility to meet contingencies, duality, and improved capability are goals that can and should be achieved."

The critical nature of the current tritium supply and the specter of what would be, in effect, unilateral disarmament if that supply could not be replenished, is our driving force. This program will eventually provide replacements for the current production reactors, and continues to be the centerpiece for modernization of the Department of Energy's nuclear weapons complex as we move into the Twenty-First Century.

The New Production Reactors Program (NPR) is well underway and we have made significant strides toward meeting our objectives. Continued strong support from the Congress will allow us to build upon the progress made so far and will enable the Department to obtain the data required to make a decision about the preferred technologies and sites for new production capacity. I would now like to provide you with a brief background description of tritium production and the vital need to ensure that the New Production Reactors Program continues forward.

Tritium, a radioactive isotope of hydrogen, is an essential ingredient in our modern nuclear weapons and is lost rapidly through natural radioactive decay. Its half life of 12.3 years equates to a loss of 5.5 percent per year of our total inventory. It must be regularly replenished or the weapon's effectiveness is dramatically reduced.

The only proven, practical method of producing tritium is the irradiation of targets in nuclear reactors. This has been acknowledged in previous studies which considered the need for construction of replacement capacity. Since the early 1980's, reports and studies have recommended that new production capacity be constructed to meet the need for replacement capacity.

The idle P, K, and L Reactors at the Savannah River Site are the Nation's only source of tritium for defense purposes. As you know, they remain shut down to allow for needed safety and operational improvements. When new reactors are constructed and ready to operate, the Savannah River Site reactors will be approximately 45 years old.

In recognition of the accelerated need for replacement capacity, and after careful analysis and consultation concerning technology and sites, DOE issued a report to Congress on August 8, 1988, announcing the Department's strategy for acquiring new nuclear materials production capacity. Since that report to Congress the Department's preferred strategy has remained unchanged.

The preferred strategy selected was based on an assessment of candidate technologies made by the Energy Research Advisory Board (ERAB); an evaluation of candidate DOE sites conducted by a Site Evaluation Team; an evaluation of comparative costs by the NPR Capacity Cost Evaluation Team; and consultations made with key agencies within the Administration, such as the Department of Defense, Office of Science and Technology, the National Security Council, and the Nuclear Weapons Council. A final decision on technologies and sites will be made by the Secretary of Energy after the completion of an Environmental Impact Statement (EIS). This formal Record of Decision is scheduled for late 1991.

As stated earlier, the preferred strategy embodies the concept of duality - a two reactor strategy, which will provide the highest assurance of reliable supplies of tritium. ERAB examined duality in its study and found that a multiple reactor strategy, utilizing diverse technologies and separate sites, would produce high production assurance, reduce uncertainties in the schedule leading to production of materials, and minimize risks to national security. The rationale for two technologies is that it reduces the risk of losing total production capacity due to unforeseen safety or technical problems generic to one design or due to design specific regulatory or institutional changes. It also offers flexibility in production capability. Multiple sites reduce the risk of loss of capability by site specific, naturally occurring events or site specific institutional or regulatory problems.

The Department is in the process of preparing Conceptual Designs and an Environmental Impact Statement to support programmatic decisions regarding sites and technologies for the NPR program. Three reactor technologies - light water, heavy water, and modular high temperature gas-cooled - are intended to be maintained as viable options until we obtain more technical data, improve cost and schedule estimates, and complete the Environmental Impact Statement review process. We are currently estimating that the Department will be able to select the best technology and sites for the NPR program by late 1991.

Substantial progress has been made in implementing this strategy. The Office of New Production Reactors was established on October 1, 1988 with its sole mission being the safe and environmentally sound construction of new production reactor capacity. This program has the unique task of coordinating and managing all Departmental activities associated with the design and construction of these reactors. The organizational philosophy of the NPR Program reflects the new approach initiated by the Secretary which calls for strong central control with increased safety, environmental, and quality assurance oversight. Separate Engineering Technology Offices for HWR, MHTGR, and LWR have been established and will maintain technical control throughout the life of the Program. Also, I have created oversight Offices for Safety and Quality and for the Environment. Finally, Project Management Offices will be established at each of the three project sites with the Project Officer reporting directly to the Director of the Program. Safety, Quality, and Environmental Field Representatives will be located at each of the three sites to serve their respective NPR Headquarters' Offices.

In keeping with Secretary Watkins' direction for strong headquarters control, the New Production Reactors Program organization has been put in place with clear lines of responsibility and authority designed to efficiently and effectively carry out our mission.

In addition to the establishment of a solid organizational structure, current activities include supporting an extensive National Environmental Policy Act (NEPA) process. The Implementation Plan for developing an Environmental Impact Statement was issued by the Department this January and work will continue on preparing the draft EIS which we expect to be available for public review and comment in early 1991.

A safety review plan has also been developed to make certain that the highest principles of safety assurance are incorporated in the planning and are adhered to in the design and construction of the new production reactors. We will be working with the Defense Nuclear Facilities Safety Board, established by the Congress, and we are also working closely with the Department's Advisory Committee on Nuclear Facility Safety, which is currently directly involved in the review of the steps to be taken in safety assurance.

We have taken steps to incorporate sound technical management principles. These steps included the retention of a Utility Engineering Group, Duke Engineering and Services, Inc., and preparation of a comprehensive Program Plan and a detailed Technical Requirements Document. Duke Services will lend considerable commercial sector experience and expertise in all facets of the design, construction, and operation of the new production reactors. The Program Plan provides a baseline of the entire program including strategies, milestones, quantitative technical goals, time-phased objectives and resource requirements. Finally, the Technical Requirements document provides an authoritative, single-source set of baseline technical and engineering requirements. This document will be used throughout the life of this program.

The award of contracts in November 1989 for design of the HWR and MHTGR was a major milestone for the Program. Conceptual design, the first design phase, will be completed this summer and will provide the Department with budget quality cost and schedule data which will be used by the Secretary in making a final decision of the technologies and sites. Design contracts were awarded to two consortia for the design of the HWR, Ebasco Services, Inc. (Babcock & Wilcox, Combustion Engineering, Rockwell International, and Battelle) and The National Production Reactor Group (Westinghouse and Bechtel) and one consortium for the design of the MHTGR (Combustion Engineering and General Atomics - CEGA). Following completion of the conceptual designs for the HWR one design team will be selected to proceed with preliminary design. The HWR preliminary design will start in the fourth quarter of FY 1990 following the final contract selection process. The MHTGR designer is expected to start preliminary design (Title I) in the third quarter of FY 1990, ahead of schedule.

Much has been accomplished over the past year and I believe that we have laid the foundation for continued success. In the immediate future we will proceed with the environmental activities necessary for preparation of a draft

EIS and, concurrently, with development, confirmatory testing and project design efforts. The pace of activities is increasing and is aimed at supporting detailed design and construction as soon as possible after a Record of Decision has been issued.

Funding in FY 1989 and FY 1990 has been at a level sufficient for initiation of design activities, analyses, continuation of the NEPA process, and confirmatory development work. The requested FY 1991 funding level of $363M, consisting of $132.9M in operating budget authority and $230.1M in capital (design) funds, is essential to support the continued broad range of activities necessary to bring new production reactor capacity on line safely, with high assurance and on a timely schedule. With the initiation of preliminary design for both reactor technologies and acceleration of the design and construction of support facilities, funding is becoming a critical factor. To maintain the pace of activities necessary to meet our schedules both near and long term, full funding of the Department's request is vitally important. The FY 1991 operating budget levels are required for the following activities:

- For confirmatory development, we are requesting $25.8M ($16.6M for HWR and $9.2M for MHTGR). This funding will be used to continue verification of design and safety requirements.

- Tritium target development funding will increase to $49.7M ($26.2 for MHTGR and $23.5 for LWR). This funding will be used for continued irradiation testing in DOE's Advanced Test Reactor and further diagnostic efforts.

- We have requested $8.3M which will be used to issue a draft EIS, conduct public hearings, resolve public comments, and prepare the final EIS.
- We have requested $16M to continue implementation of the safety review process, including the refinement of safety requirements and the continued independent reviews of safety issues and documentation resulting from design activities.

The NPR will require 115 Full-Time Equivalents in 1991. Our request of $33.1M for Program Direction and Support reflects an influx of the highly skilled expertise necessary to perform the design, safety and environmental functions described above and to manage a program of this magnitude. In addition, these funds will provide for: safety, QA, environmental, and design reviews; acquisition of data processing equipment and software; administrative activities; and contractor support to the NPR.

We are also seeking $230.1M in capital (design) funds in FY 1991 to continue with facility engineering and preliminary design. Conceptual designs will have provided detailed assessments of major concept issues and trade off studies and evaluations, identified engineering development requirements, developed improved cost estimates, and provided an initial project schedule. Preliminary (Title I) design, to be initiated in FY 1990, will take the baseline established in the Conceptual Design Report and the Requirements Document and will further define the requirements and criteria which will govern the detailed design. Title I design, which will continue through FY 1991, will be funded using construction (design) monies although no actual construction would take place until after the Record of Decision. In FY 1992, we plan to initiate Title II design, long lead procurement, and design of support facilities.

Mr. Chairman, in conclusion, I stated earlier that this was an ambitious endeavor that is absolutely essential. Our request of $363M for FY 1991 is needed to continue our mission of providing new production capacity on an expeditious schedule for eventual replacement of our current tritium supply system. Because of this, I know that the Department and the President place a high priority on the program I have just outlined. In a little over a year, we have assembled a highly qualified staff to manage this program and are continuing to seek additional qualified personnel. We have made substantial progress in advancing the NEPA process and will have completed the EIS by the end of 1991 as we move towards the Record of Decision. Your assistance in assuring adequate funding has also enabled us to retain the services of the best the commercial nuclear industry has to offer, set up stringent safety and quality assurance requirements, and most important meet our schedule of commencing conceptual design. Your continued assistance in assuring adequate funding is essential to the success of our mission of assuring the Nation a safe and reliably sound nuclear deterrent.

* * *

U.S. Department of Energy
Office of Scheduling
Washington, D.C. 20585
202/586-4292

BIOGRAPHY

DOMINIC J. MONETTA

Dominic J. Monetta was appointed Director, Office of New Production Reactors, U.S. Department of Energy (DOE), on June 12, 1989. In this position, Dr. Monetta is responsible for directing DOE's program to design, acquire and build new production reactor capacity in support of the Department's defense mission. He is also responsible for the planning, research and development, safety certification, environmental compliance and construction activities related to reactor deployment.

Since 1986, Dr. Monetta has been serving as Technical Director at the Naval Ordnance Station at Indian Head, Maryland, which acts as the Navy's Center of Excellence for propellants and explosives used in guns, missiles and rockets. Indian Head is considered by the Department of Defense to be a national resource for the processing of energetic materials.

From 1980 to 1986, Dr. Monetta was President of Resource Alternatives, Inc., a strategic planning consultant firm located in Washington, D.C., where he provided consultation on issues related to nuclear energy development and basic research in fossil energy.

Prior to this position, from 1978 to 1980, Dr. Monetta was Director of Planning and Analysis for the Gas Research Institute, Chicago, Illinois, where he established this nationally recognized gaseous fuels planning and analysis function, and initiated new methods for planning gaseous energy research and development programs. He also was responsible for formulating policy and directing economic and budgetary analyses.

From 1977 to 1978, Dr. Monetta served as Director of Field Coordination for DOE's Office of Fossil Energy. In this position, he was responsible for the administration of all eight DOE fossil energy and mining operations centers. He developed and implemented long-range planning strategies for shale oil production, and defined and implemented program decentralization options for coal gasification and liquefaction technologies.

From 1975 to 1977, Dr. Monetta held several positions of increasing responsibility in the Energy Research and Development Administration, DOE's predecessor organization. During this time, he was responsible for planning, developing and managing various energy programs, including a national applied research and development program for improved energy conversion efficiency, waste-heat utilization and fuel cells. Dr. Monetta was the first U.S. representative on the energy conservation working party of the International Energy Agency (IEA).

(more)

From 1970 to 1975, Dr. Monetta served as Director of the Gun Systems Engineering Division, Department of Defense Naval Ordnance Station, which he established in 1970. Division responsibilities comprised all aspects of U.S. Navy gun propellants and gun-launched rocket propulsion systems, including research, development, testing and production. During this period, Dr. Monetta also chaired the Gun Propulsion Technology Working Group of the Joint Army, Navy, NASA, Air Force Committee (JANNAF).

Dr. Monetta served as a technical advisor to the Command Officer and the Technical Director managing Long Range Bombardment Ammunition (LRBA) development, Department of Defense Naval Ordnance Station, from 1963 to 1970.

Dr. Monetta received a B.S. in Chemical Engineering from Manhattan College, New York, New York, in 1963; an M.S. in Administration from George Washington University, Washington, D.C., in 1973; and a D.P.A. in Public Administration from the University of Southern California, Los Angeles, California, in 1981. He is the author of a number of scientific and managerial publications, and holds memberships in several professional organizations, including AICHE.

Dr. Monetta is married, has two sons, and resides in the District of Columbia.

TESTIMONY OF

JOHN T. CONWAY, CHAIRMAN
A. J. EGGENBERGER, VICE CHAIRMAN
EDSON G. CASE, MEMBER
JOHN W. CRAWFORD, Jr., MEMBER
HERBERT KOUTS, MEMBER
DEFENSE NUCLEAR FACILITIES SAFETY BOARD

FY 1991 APPROPRIATIONS HEARING

COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
UNITED STATES HOUSE OF REPRESENTATIVES

MARCH 13, 1990

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

We appreciate the opportunity to appear before you to present the FY 1991 budget request for the Defense Nuclear Facilities Safety Board (Board).

BUDGET OVERVIEW

Our budget request for FY 1991 is $12.5 million to support the work of the Board during our initial full year of operation. This is $3.5 million more than our FY 1990 start-up budget. Approximately $2 million of this increase is earmarked to cover a full year of salaries and benefits for the Board's employees. The balance of this budget increase, $1.5 million, is allocated to fund technical support contracts necessary to assist the Board in carrying out its independent oversight mission.

PROGRAM OVERVIEW

The Board has been in operation for about 4 months; we were sworn into office on October 25, 1989. At an early stage, we began to review selected Department of Energy (DOE) defense nuclear facilities that DOE considers to be urgent in light of its mission, primarily the Savannah River Reactors, the Rocky Flats Plant, and the Waste Isolation Pilot Plant. Our priorities also included evaluation of a potential waste storage safety problem at the Hanford Site.

At the same time, the Board had to address numerous administrative requirements and obstacles attendant to the formation of a new Federal establishment.

SAVANNAH RIVER SITE (SRS)

The Board began its independent oversight at the Savannah River Site by an initial visit and by the subsequent follow on use of specialist teams led by individual Board Members. We are continuing to review the Savannah River situation.

The Board will avoid interfering with DOE's program to manage the Savannah River Site or any other facility under its jurisdiction. Rather, the Board intends to provide recommendations to the Secretary of Energy resulting from independent review of site activities that could have an impact on public health and safety.

As of today, the Board has made two sets of recommendations to the Secretary pursuant to the requirements of Chapter 21 of the Atomic Energy Act, and is awaiting the Secretary's response. On February 22, 1990, we transmitted our first set of recommendations to the Secretary of Energy concerning the training of reactor plant operators and supervisors at the Savannah River Site. On March 8, we submitted another set of recommendations respecting safety standards. We have included copies of the above recommendations as an attachment to our testimony.

ROCKY FLATS PLANT

The Board made two visits to the Rocky Flats Plant. We have gained first-hand knowledge of the functions of the Plant, its condition, the manner in which operations are being carried out, and problems relative to assuring adequate public health and safety. During these visits, the Board met with federal and state legislators, the Governor of Colorado and members of his staff, various citizen groups, labor union officials, and had meetings with local DOE and contractor officials. We made ourselves available to the local press. We strove to acquire a broad perspective on the issues associated with the Rocky Flats operation. In our review of activities at this facility, we are being assisted by the experts referred to previously.

WASTE ISOLATION PILOT PLANT (WIPP)

The Board made an initial familiarization visit to the WIPP Facility in January. During this visit, presentations were made by senior DOE and contractor personnel relating to the history of the project and the current issues facing DOE management including the numerous experiments for characterizing the expected performance of the facility.

The Board plans to arrange several follow-up trips to WIPP by technical review teams. We plan to schedule these visits and be in a position to make any necessary recommendations within the time frame the WIPP will be ready to receive waste for the test-phase operation of the facility.

HANFORD SITE

Three members of the Board visited the Hanford Site in December 1989. The visit concentrated on the cleanup activities under way, the activity being conducted in preparation for the restart of operations at the Purex Plant, the work being conducted toward dry standby status of the N-Reactor, and the work in the Plutonium Finishing Plant.

The Board is reviewing a potential safety matter that has been brought to our attention. This concerns the possibility that existing storage tanks at the site for high level waste from fuel reprocessing might be subject to chemical explosions that could lead to the dispersal of radioactive material. Analysis has been made in the past by DOE's Hanford contractor to establish its position that the possibility of such an explosion is very low. This question was discussed in some detail during our visit, and the Board has been provided with the documents containing this analysis and the conclusions that had been drawn. The Board has retained the services of several expert consultants to perform an independent review of the analysis and conclusions in the DOE contractor's report, and to advise the Board on their technical findings.

MANAGEMENT ACTIVITIES

The Board is confronted with pressing administrative problems that directly impinge on our programmatic mission. The primary problems involve personnel and office space.

The Board and the Secretary of Energy agreed at the outset that the Board, an independent establishment, should not be quartered in facilities of the Department of Energy. The General Services Administration (GSA) initially informed us that it was not able to obtain any space for us. For lack of space, it was necessary for the Board to operate temporarily out of two rooms in the basement of the Forrestal building during our first 3 months of operations. We have since been furnished temporary Government quarters, and hope to have sufficient, permanent office space to house the employees of the Board by early summer 1990.

STAFFING ISSUES

The Board is faced with the task of locating and hiring qualified technical and support personnel. We have an acute need for qualified senior individuals who are well-grounded in one or more technical fields. The highly technical nature of our work coupled with a short supply of available talent results in the Board competing with other government agencies and with private industry for individuals possessing the prerequisite experience and skill levels. We have found that our enabling legislation does not provide us with the hiring flexibility that other competing agencies, such as the U.S. Nuclear Regulatory Commission, possess. Thus, we are at a severe disadvantage in our recruiting efforts.

The seriousness of our need to obtain the services of well-qualified persons cannot be overstated. The Board believes that the key to carrying out our mandate rests on our ability to build a highly competent staff capability that enables us to reach sound judgements in a reasonable time frame.

SUMMARY

To summarize, our first four months of operations have provided the Board with the challenging and complex task of selecting both the DOE sites and the safety issues on which we should concentrate our early reviews and evaluations. Due to the urgency and sensitivity of the issues, the Board quickly initiated review activities at the four sites previously discussed in our testimony, and intends to continue to pursue the discharge of our statutory responsibilities at these and other DOE defense nuclear facilities while we continue to address the many managerial issues associated with the start-up of any new agency.

With a limited operating experience of only 4 months, our FY 1991 budget request of $12.5 million has been developed to provide us the necessary flexibility to fund and manage our independent oversight activities as we become aware of safety issues during our reviews.

Thank you for the opportunity to report to you on the Board's progress in meeting the challenges before us. We will be happy to answer any questions you may have.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

John T. Conway, Chairman
A.J. Eggenberger, Vice Chairman
Edson G. Case
John W. Crawford, Jr.
Herbert John Cecil Kouts

February 22, 1990

Honorable James D. Watkins
Secretary of Energy
Washington, DC 20585

Dear Mr. Secretary:

On February 22, 1990, the Defense Nuclear Facilities Safety Board met and in accordance with Section 312(5) of Public Law 100-456 approved a number of recommendations which I am sending you enclosed for your consideration.

Section 315(A) of Public Law 100-456 requires the Board, after receipt by you, to promptly make these recommendations available to the public in the Department of Energy's regional public reading rooms. Please arrange to have these recommendations placed on file in your regional public reading rooms as soon as possible.

The Board will publish these recommendations in the Federal Register.

Sincerely,

John T. Conway

John T. Conway
Chairman

Enclosure

HAND DELIVERED

RECOMMENDATION TO THE SECRETARY OF ENERGY
pursuant to Section 312(5) of the
Atomic Energy Act of 1954, as amended.

Dated: February 22, 1990

The Board has proceeded to give high-priority attention to the contemplated restart of the K, L, and P reactors at the Department's Savannah River site. This is in line with the intention of the Board to perform its duties on a schedule compatible with the Department's defense missions, to the extent such course is consistent with the Board's statutory responsibilities.

The Board believes that the DOE standards for training of reactor plant operators and supervisors at Savannah River have not been adequately determined and specified. Having given due regard to the technical and economic feasibility of implementation in accordance with the statute, the Board recommends:

a. That DOE determine and specify the qualifications that reactor plant operators and supervisors will be required to demonstrate before restart of the K, L, and P reactors;

b. That DOE identify any differences between its approved qualifications and those prescribed by NRC for analogous positions in the civilian nuclear power field; that where differences, if any, exist, DOE identify any supplemental measures that have been adopted in view thereof;

c. That DOE make a comprehensive review of the current level of qualifications of each reactor operator and supervisor employing both written and oral examinations, so as to establish that the scope and content of the training program will achieve the knowledge prerequisite for restart;

d. That the reactor plant operator and supervisor training programs be modified as necessary to take account of the required qualifications and the current state of knowledge and experience of the operators and supervisors as indicated in c. above;

e. That DOE accelerate implementation of a configuration management program to help assure that as-built drawings of safety-related systems are available for training of operators and supervisors in procedures and for discipline of operations (e.g. valve line-ups); and

f. That the operators and supervisors be qualified in use of the revised procedures that will be in place for normal operations and for emergency situations.

John T. Conway.

John T. Conway, Chairman

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

John T. Conway, Chairman
A.J. Eggenberger, Vice Chairman
Edson G. Case
John W. Crawford, Jr.
Herbert John Cecil Kouts

HAND DELIVERED

March 8, 1990

Honorable James D. Watkins
Secretary of Energy
Washington, DC 20585

Dear Mr. Secretary:

On March 8, 1990, the Defense Nuclear Facilities Safety Board, in accordance with Section 312(5) of Public Law 100-456, approved a number of recommendations which are enclosed for your consideration.

Section 315(A) of Public Law 100-456 requires the Board, after receipt by you, to promptly make these recommendations available to the public in the Department of Energy's regional public reading rooms. Please arrange to have these recommendations placed on file in your regional public reading rooms as soon as possible.

The Board will publish these recommendations in the Federal Register.

Sincerely,

John T. Conway

John T. Conway
Chairman

Enclosure

RECOMMENDATION TO THE SECRETARY OF ENERGY
pursuant to Section 312(5) of the
Atomic Energy Act of 1954, as amended.

Dated: March 8, 1990

As required by the Atomic Energy Act, the Defense Nuclear Facilities Safety Board has begun a review and evaluation of the content and implementation of standards relating to the design, construction, operation and decommissioning of defense nuclear facilities of the Department of Energy (DOE). In its initial phases, the Board has concentrated its efforts on evaluating the adequacy of DOE Orders and Draft DOE Orders as they apply to health and safety aspects of defense nuclear activities at the Savannah River Site and associated Orders which have been issued by DOE's Savannah River Operations Office. To date, the Board's review has preliminarily addressed the content of these Orders. The review has not yet extended to implementation. Also, the Board is not certain that it has seen all applicable DOE standards as they apply to health and safety at the Savannah River Site.

The results of the Board's review to date indicate a large degree of variability in the level of detail specified by such Orders and, in general, a level of specificity much less than is found in Nuclear Regulatory Commission requirements applied to commercial nuclear facilities. The Board has found further that there is a lack of uniformity among such Orders as to whether they are mandatory, non-mandatory, or referenced for information. In addition, the review also has disclosed that a number of DOE Orders embodying safety requirements are in draft form, with substantial uncertainty as to when or in what form they will be issued.

In view of the foregoing and other information relating to DOE Orders provided by the Department, the Board recommends the following:

- That the Department identify the specific standards which it considers apply to the design, construction, operation and decommissioning of defense nuclear facilities of the Department of Energy (including all applicable Department Orders, regulations, and requirements) at the following defense nuclear facilities as follows:
  - Savannah River Site: K, L, and P Reactors
  - Rocky Flats Plant: Buildings 371, 374, 559, 707, 771, 774, 776, 777 and 779

- -- Hanford Site: Plutonium Finishing Plant; Purex Facility, together with associated waste processing and storage facilities; N-Reactor (including decommissioning); and K-Reactor Storage Basins

- -- Waste Isolation Pilot Plant.

o That the Department provide its views on the adequacy of the standards identified in the above process for protecting public health and safety at the defense nuclear facilities referred to, and determine the extent to which the standards have been implemented at these facilities.

We believe it is necessary for the Department eventually to accomplish the above for each defense nuclear facility under its jurisdiction. The facilities enumerated in these recommendations are those which the Board understands to be among those which have high priority within the Department and on which the Board has focused its attention.

John T. Conway

John T. Conway, Chairman

JOHN T. CONWAY

John T. Conway, an engineer and attorney, is Chairman of the Defense Nuclear Facilities Safety Board. His nuclear experience includes 12 years on the staff of the Joint Committee on Atomic Energy, U.S. Congress (six years as Staff Director), 11 years as President/Chairman of the Board of the American Nuclear Energy Council, and eight years as Chairman of the Con Edison Indian Point Nuclear Facilities Safety Committee. Following is a brief resume:

Oct. 1989 - Present	Chairman, Defense Nuclear Facilities Safety Board
1982 - 1989	Consolidated Edison Company, Executive Vice President
1982 - 1989	American Nuclear Energy Council (ANEC) Chairman
1978 - 1982	American Nuclear Energy Council (ANEC) President
1968 - 1978	Consolidated Edison Company, Executive Assistant to Charles F. Luce, Chairman of the Board (1970-78, duties included Chairman, Nuclear Facilities Safety Committee)
1956 - 1968	U.S. Congress - Staff, Joint Committee on Atomic Energy (1958-62, Assistant Staff Director; 1962-68, Executive Director)
1950 - 1956	FBI, Department of Justice, Special Agent - served in Kentucky, New York, Washington, D.C.
1949 - 1950	Meighan & Necarlsomer Law Firm, Associate

Education	Columbia University School of Law, LLB, 1949 (converted to Juris Doctor, 1969) Tufts University, BS Engineering, 1947
Military Service	U.S. Navy, active duty February 4, 1943 to September 1946; Saw service in North Atlantic, USPC781, Discharged Lt. (j.g.)
Professional Memberships	Admitted to New York Bar, 1949, and Supreme Court of the United States, 1953

A. J. EGGENBERGER

An expert in nuclear safety and earthquake engineering, A. J. Eggenberger was nominated by President George Bush in August 1989 to be Vice Chairman of the newly established Defense Nuclear Facilities Safety Board.

Prior to assuming his new office, Eggenberger was a senior official at the National Science Foundation serving as Program Director and Leader of the President's Earthquake Hazard Mitigation Program. In addition to his significant contribution at the Foundation, the Department of Energy recognized Eggenberger's broad experience and knowledge by selecting him to be a member of the Committee on Seismic Isolation for the New Production Reactor Program and as a member of the Board of Governors for the Seismic Technology Program.

Eggenberger's expertise in the area of nuclear technology was acknowledged by the international community when officials of the International Atomic Energy Agency in Vienna, Austria, requested him to serve as an expert consultant with the Division of Nuclear Safety. For the past five years until he assumed his new position, Eggenberger was able to share his considerable knowledge, providing expert services to the Agency and its member states on nuclear safety issues related to the siting and construction of nuclear facilities.

Until joining the National Science Foundation in 1984, Eggenberger was an Associate Partner with D'Appolonia Consulting Engineers in Pittsburgh, Pennsylvania, where he was directly in charge of the Nuclear Facilities Group. Under his direct management, this Group dealt with engineering issues ranging from mining, milling, fabrication, reprocessing, to disposal of units in the U.S. and abroad. Eggenberger also has extensive participation in Naval Reactors prototype programs.

Early in his career (1967 to 1972), Eggenberger was a Professor and Researcher at the University of South Carolina in Columbia.

Eggenberger graduated with a Bachelor of Science from Carnegie Mellon University in 1961. He earned a Master of Science from The Ohio State University in 1963, followed by a Doctor of Philosophy in 1967 from Carnegie Mellon University.

Following confirmation by the United States Senate, A. J. Eggenberger's was sworn in as Vice Chairman of the Defense Nuclear Facilities Safety Board, effective Octrober 19, 1989.

January 1990

EDSON CASE

During his military and civilian careers, Edson Case has been in the forefront of the development and implementation of nuclear safety policy.

Case graduated from the United States Naval Academy in 1946 as an Ensign and spent the next 15 years as a Naval Officer. For several years during the 1950's, Case worked directly for Admiral Hyman Rickover as a Project Officer in the Naval Nuclear Propulsion program.

In his 30-year civilian career, Case was a senior staff member of the U.S. Atomic Energy Commission and the Nuclear Regulatory Commission (NRC). For over 10 years at the NRC, he was Deputy Director and Director of the Office of Nuclear Reactor Regulation, responsible for all safety aspects of commerical nculear power plants, including their location, design, construction, and operation.

Case retired from the NRC in 1985, and until recently provided consulting services to the Commission. In August 1989, President George Bush nominated Edson Case to be a Member of the newly established Defense Nuclear Facilities Safety Board. In his appearance before the Senate Committee on Armed Services, Case stated his belief in timely decisionmaking, firm yet fair decisions, and his strong support of a competent technical staff. Following confirmmation by the United States Senate, Case was sworn-in as a Member of the Board in October 1989.

Case received degrees from the United States Naval Academy and the Massachusetts Institute of Technology. In 1982, he received the Meritorious Executive Award in the Senior Executive Service.

Case and his wife, Rita, have six grown children.

January 1990

JOHN W. CRAWFORD, JR.

Jack Crawford has spent almost his entire working career in the applications of military and civilian nuclear technology. Prior to being sworn in as a Member of the Defense Nuclear Facilities Safety Board, he was an Independent Technical Consultant under the Trust Agreement for the cleanup of the Three Mile Island nuclear power plant.

He began his Naval career during World War II serving in USS YORKTOWN, USS SANTEE, and USS BROOKLYN. Following duty as Submarine Repair Superintendent at the Philadelphia Naval Shipyard, Crawford served in various assignments with the Atomic Energy Commission (AEC) in the area of naval reactors. His responsibilities included providing guidance and direction to ensure that required safety, quality and reliability standards were incorporated in the planning and construction of naval nuclear power plants. He served under Admiral Rickover as Deputy Manager of Naval Reactors.

Following retirement from the United States Navy with the rank of Captain, Crawford returned to the Atomic Energy Commission (subsequently the Department of Energy) to begin a career in civilian nuclear technology. He held increasingly responsible positions culminating in being appointed Principal Deputy Assistant Secretary for Nuclear Energy. As Principal Deputy he carried out a comprehensive "post-TMI" assessment of the safety of DOE nuclear reactors, the widely publicized "Crawford Report." He retired from the Department of Energy in 1981.

After graduation from Tilton School, Crawford attended Norwich University, graduated with distinction from the United States Naval Academy in the class of 1942, and earned two Masters Degrees from the Massachusetts Institute of Technology (Naval Construction and Engineering, 1946, and Physics, 1950). He completed the curriculum at the Federal Executive Institute in 1968.

Selected by President George Bush and confirmed by the United States Senate to serve as a Member of the Defense Nuclear Facilities Safety Board, Crawford brings to this position comprehensive knowledge and experience in the engineering and construction of nuclear reactors and almost forty years of government service.

Married to the former Elizabeth F. Edwards, Crawford and his wife have three grown children and reside in Maryland.

January 1990

HERBERT KOUTS

BIOGRAPHICAL INFORMATION

EMPLOYMENT

1950 - 1973 Brookhaven National Laboratory, Upton, New York

1950-1952	Head, Reactor Shielding Group
1952-1968	Head, Experimental Reactor Physics Group
1968-1973	Head, Technical Support Organization (Think Tank for DOE in nuclear materials safeguards)

1973 - 1975 United States Atomic Energy Commission, Washington, D.C.

Director, Division of Reactor Safety Research

1975 - 1976 United States Nuclear Regulatory Commission, Washington, D.C.

Director, Office of Nuclear Regulatory Research

1976-Present Brookhaven National Laboratory, Upton, New York

1976-1978	Head, International Safeguards Project Office
1977-1988	Chairman, Department of Nuclear Energy
1988-Present	Senior Physicist, Department of Nuclear Energy

EDUCATION

B.S. Mathematics	1941	Louisiana State University
M.S. Physics	1946	Louisiana State University
Ph.D. Physics	1952	Princeton University

MEMBERSHIPS

American Nuclear Society
National Academy of Engineering
International Nuclear Safety Advisory Group (INSAG)
New York Academy of Sciences

AWARDS

E.O. Lawrence Award	1963
Atomic Energy Commission's Distinguished Service Award	1975
Nuclear Regulatory Commission's Distinguished Service Award	1976
ANS Nuclear Reactor Safety Division's Tommy Thompson Award	1983

WEDNESDAY, MARCH 14, 1990.

ATOMIC ENERGY DEFENSE ACTIVITIES; NAVAL REACTORS DEVELOPMENT

WITNESS

ADMIRAL BRUCE DeMARS, U.S. NAVY, DIRECTOR, NAVAL NUCLEAR PROPULSION

Mr. BEVILL. The committee will come to order.

Pursuant to the decision of the committee last Thursday, the hearing for today will be closed. Only those who have appropriate clearances will remain in the room.

Admiral DeMars, would you please see that only those who have appropriate clearances are in the room?

Admiral DEMARS. Yes, sir.

Mr. BEVILL. I would like to remind the members of the subcommittee not to remove any materials from the hearing room, since much of the information is classified.

Admiral, we are pleased to have you with us. You may proceed.

Admiral DEMARS. Thank you very much. I have a statement for the record I would like to submit.

Mr. BEVILL. Without objection, that will be made a part of the record. You may summarize your statement as you please.

OPENING STATEMENT

Admiral DEMARS. Thank you.

I would like to summarize. I know that you realize Naval Reactors is a complex program, but I would like to run through it briefly. I am responsible for 178 reactor plants, 147 of them are on nuclear-powered ships.

By contrast, there are only 108 civilian reactors in the United States. So this is a very large operation. About 30 more nuclear-powered ships are under construction to replace ones that we will be retiring. About 40 percent of the combatant fleet of the U.S. Navy is nuclear-powered.

I am also responsible for eight shipyards that do nuclear work. As we speak, there are some 57 nuclear powered ships either being built or in overhaul over which we must keep close control.

I also run a large training program. I have trained about 3,500 new officers or enlisted men every year in order to keep the program running. In the past year, I shut down one of my land-based training reactors in Idaho that had reached the end of its long life; it operated for 36 years. It was the original prototype reactor for the NAUTILUS, we got long and faithful service out of it.

We are in the process of removing the fuel from that prototype right now. The last core in that reactor lasted 22 years, which was a world record for having a core in a reactor when we pulled it.

MOORED TRAINING SHIP

Seven more land-based training reactors remain. Last year, we started operation of the Moored Training Ship. It is a converted strategic submarine based in Charleston, South Carolina. The missile compartment was removed, the prices rejoined, and special systems were put in the front end in order to make it a training reactor facility.

We graduated our first students there last week. We had a minor setback due to Harricane Hugo, but we are back in operation. That is going well.

That is a new milestone for the program. [Deleted.]

The second Moored Training Ship is at the Charleston Naval Shipyard now being converted. It will be in operation in another several years. Operation, of course, is a big job. It requires a very dedicated staff.

I want to say that I appreciate the pay raise for senior government executives. It is very important to the dedicated senior civil servants who have worked for many years in my program. My section heads all have an average of about 25 years of Federal service. So that pay raise is a very important thing for me to keep this program running.

ENVIRONMENTAL AND NUCLEAR SAFETY

Naval reactors have a superb safety and environmental record. We have over 3600 reactor-years of safe operation. Some 81 million miles steamed. We haven't had a reactor accident, but equally important, we've had no discernible impact on the environment in that entire period.

I will show you some of the indicators of the degree of attention we pay to these matters in the program. This is a plot of the number of ships we have in operation over the years, starting back in 1959 with less than 10, and ending today with some 147. Also plotted here is the total man-rem per year, or total occupational radiation exposure that people have gotten from the Program each year.

You can see in the sixties the climb as the ship numbers came up. Admiral Rickover decided that that was unacceptable, and we started a man-rem reduction program. I was a Lieutenant in the fleet then, wondering what this was all about.

Now, we are managing it down at these levels. Although the Federal limit is 5 rem per year for individuals in occupational radiation work, we manage at two rem per year—almost all the actual exposures are well below that—simply because it is more prudent to do it that way.

We have accommodated changes over the years. That is typical in the Program. We normally set our standards higher, or in this case lower, than the numbers Federal guidelines require.

Mr. **Bevill**. On the chart you showed the red line was going up.

Admiral **DeMars**. That is the number of ships.

Mr. **Bevill**. Even though the number has increased?

Admiral **DeMars**. While the operation has gotten significantly bigger, exposure hasn't. This is very, very important to our operation. As the whole world becomes more sensitive to radiation, we are well below any threshold that should make people nervous, and will continue to stay so.

So, as the program has grown, we have driven down the total man-rem per year—the accumulated total, not the average per person, but the total man-rem per year.

Today, when we have 147 ships, the total man-rem per year is about the same as it was when we had only 30 ships. We have gone from 30 to 147 ships, with all those crews, and kept the total radiation received about the same, although we have significantly more people in the program now.

Similarly, in the solid waste disposal area, this shows once again the increasing number of ships that could generate the solid waste. In the sixties, the amount of waste started to climb again. We have driven it back down, and are managing to keep down the amount of waste that we generate.

In the two DOE facilities that I run, by nature we do not discharge a lot to the environment. This shows the average annual radioactivity released to the environment by the various Department of Energy Operations Offices. My two offices are significantly lower. That is not to denigrate the other DOE facilities, but it is to point out that we don't run production or chemical processing facilities. That is the difference. Our emissions are significantly less because of that and because we do manage very carefully and we work very hard on keeping them low. But, again, ours are not production facilities, and therefore we are completely different with respect to the amount of radiation we release in the environment.

REACTOR DISPOSAL AT HANFORD

Also submarine reactor compartment disposals typify a part of the program I am very proud of. We sent eight old reactor compartments to the Hanford Reservation in Washington. They are essentially the middle parts of the submarine that have been removed, cleaned out of things that are bad such as PCBs so we can put them in the burial site, sealed up, taken up the Columbia River, and placed in permanent storage at Hanford.

Eventually, as we put more compartments in, they will be covered over. This year we are working on six more that we hope to be able to ship. They are dismantled at the Puget Sound Naval Shipyard. We have 17 more submarines that have had their fuel pulled out, their systems inactivated, and are ready to have their reactor compartments cut out at Puget.

The FY 1991 budget includes provision to deactivate eight more submarines. So we have to keep after the disposals. They will be an environmental liability if we don't. We have had to broker our way through the Department of Energy, the regional EPA, the Headquarters EPA, and the States of Washington and Oregon to make this whole thing work our properly.

I think we are the only people that are really disposing of low level radioactive waste in the country who have gotten a letter from a Governor, in this case the Governor of Washington, thanking us for doing it right.

Mr. BEVILL. Is this the actual disposal of waste in this picture?

Admiral DEMARS. Yes, sir. What remains in the compartment is the reactor vessel, the primary coolant loops and so on that are all irradiated and contaminated. There is no fuel in them. The reactor compartment is all sealed up and put in the ground. It will remain there indefinitely.

Mr. MYERS. What is the half-life?

Admiral DEMARS. Almost 100 years for nickel-63. For Cobalt-60, the half-life is about 5 years. The exact half-lives escape me. I should know them.

Mr. MYERS. That is all right. It is a long time.

Admiral DEMARS. Yes, sir, it is long-term storage. That is why we had to coordinate so much with all the facilities and the States and so on, because it will be there for a while. When you buy a nuclear submarine, you get a disposal container along with it. We have analyzed the hulls and they will last 400 years or so.

It will decay almost entirely and the hull will still be intact.

Mr. BEVILL. Is that land or water disposal?

Admiral DEMARS. That is all land. It is just a berm, and then eventually when we have enough in there, we will cover it over with a clay cap; have a well system where DOE can monitor the well water and make sure that there is no migration of that into the ground water. It is something that we need to keep after as we continue to decommission nuclear-powered submarines.

ENVIRONMENTAL OVERSIGHT

We are subject to all the environmental laws and oversight in the country. We have no exemptions from any of that in our facilities. We receive inspections by the State and Federal agencies, such as the EPA, regularly. In the last 10 years, we have had over 100 inspections by State and Federal agencies at my facilities to ensure that we are doing things right. These inspections were done under the Clean Air Act and the Clean Water Act, the Resource Conservation and Recovery Act and so on, we have never had any significant liabilities. We have never been fined or cited or anything. We are not on the National Priorities list. We manage the environment as tightly as everything else in the Program that has to do with the nuclear reactors. We manage all environmental aspects of it.

Unfortunately our record, which is very good, invites attention. There are people who would like to tar us with other brushes because we are a fairly valuable scalp to hang on their wall if they could find that we were doing something wrong.

We regularly get probes and inquiries and are able to answer them satisfactorily at all times. I am currently having a running problem with one of my labs, the Knolls Atomic Power Lab, where we had several disgruntled employees who complained about radiation or environmental questions.

We have answered all questions professionally. We have had people who have no allegiance to either side—the DOE Inspector General—come in and put the issue technically to rest. However, these things appear to have a life of their own. They never go away. The arguments continue to change. It really is not a level playing field, because as government employees, we are required to answer things factually, and the people who are registering allegations don't live exactly by the same set of rules.

So, I am afraid this will continue on. We now have a GAO audit team up there. We have a very clean record—hopefully that will put it to rest. It is very time and resource consuming in an organization that has a lot of other things to do.

I am not, per se, against whistle-blowers. One can say my organization is full of them. We are forever blowing whistles on ourselves. But I think if there were some way to cause the whistle-blowers to stand behind their allegations such as certifying what they say or having to sign for the validity of their allegation, I think it would have a proper effect on nulling out some of the egregious claims that turn out not to be valid.

Once you put the initial allegation to rest, it is cast in a different light and they come at you again and again and again. It is very time-consuming. It is important that we maintain our unblemished record, because we are allowed in over 150 ports in the United States, ports and harbors in the United States and foreign countries, [deleted].

We are careful about people and the environment. We are very, very detailed in our technical approach and our operational approach. We have to maintain that posture. So that is why I am concerned, even about unfounded allegations. When they end up in the paper, it doesn't matter whether they are true or not, [deleted]. It has worked for over 35 years, but it is getting harder to do because of all of the scrutiny of things nuclear these days.

SOVIET SUBMARINES

To show you what can happen if you lose control of a program or possibly never had control to begin with, this is a compilation of Soviet nuclear accidents on their nuclear-powered submarines, and in one case, the LENIN—a nuclear-powered ice-breaker. So you can see they have had very, very severe problems. [Deleted.]

Obviously, this country would never stand for this sort of a program. We would have been shut down long, long ago. I have been convinced for a number of years that once the Soviet people understand this, they won't stand for it, either. [Deleted.]

Mr. BEVILL. Doesn't that make you nervous when you think of the ICBMs pointed at the cities over there? We are relying on their safety factors?

Admiral DEMARS. [Deleted.]

Of course, operating a reactor is different. It has to be designed right, built right and operated correctly by people who know what they are doing and are regularly examined and looked at. They don't have that system.

Mr. BEVILL. When you add Chernobyl to those deaths there, as well as those from the accident that they supposedly had many years ago, it is a pretty grim picture, isn't it?

Admiral DEMARS. Yes, sir, and I think it is starting to catch up with them.

In the open literature now, there are serious complaints and allegations from inside their navy—people who served on the submarines are complaining about the way they have been designed, and the people who designed them are complaining about the way they are being operated. They don't focus all the responsibility on one organization, as we do. Naval Reactors assumes responsibility for every aspect of it. The design, construction, the operation, the spare parts, the logistic support and the ultimate disposal.

In the Soviet Union, there are a number of different agencies and bureaus. They can't build busses correctly, so it is a wonder they build submarines at all. We should not be surprised at this sort of a problem, but it is very serious and they have to do something about it. It is difficult to figure out what you do about it when you have run a program like that for over three decades. How do you turn it around in the short term? It is very difficult.

SSN-21

Moving on to our major developmental project the SSN-21, if I might talk about that for a while. I think it is interesting to look at this old model here, which is fairly primitive-looking. But this is the actual model that Admiral Rickover used to explain the concept of a nuclear-powered submarine to President Eisenhower a long time ago. He obviously was skillful at it, because he sold the program.

Maybe it's a commentary on our ability, but we need these much fancier, high-priced models here to illustrate the same things to keep the program running. But the reactor development part of the SSN-21 is on track today.

There are still many challenges to overcome, but technically, and time-wise we are on track. If it weren't a great challenge, then we wouldn't be reaching far enough. A project like this takes about 12 years to bring off from initial conception. We are about eight years into it. If it wasn't a difficult job every day, we probably wouldn't be happy with the product when we finally got it.

There are frequent discussions in the Department of Defense on the "fly-before-buy" concept—where you ought to build one and check it all out and make sure it works before you build the second and third ones. When a project takes 12 years from start to finish, you don't get many ships in a period of time.

I would like to give you a different perspective on the fly-before-buy issue. Really, it is nothing more than prudent engineering. It is the way Naval Reactors has done things for years. We are largely the driver in how well a submarine turns out, because we control how far it is going to go. We control, by and large how quiet it is going to be, and certainly, the weight and the depth and so on. We control essentially everything but the business up in the front end. I would like to show you some of the stuff that we have tested and worked with.

REACTOR DESIGN

This model shows how the submarine will be built. The various pieces that come apart are the sections in which the submarine will be built. This is the reactor vessel. These are the reactor coolant pumps. The fuel system goes in there.

[Deleted.] Now, we have built a full core to the specifications that will go on the SSN-21. It [deleted].

We will essentially have worked our way through the core and put all those pieces together. If I can show you one other part in the reactor compartment—the forward bulkhead, which has the pressurizer on it and the steam generator—you can see we have the ability to build it this way, by laying this thing down. Previously, we built the whole hull and put holes in it and stuck the things in. This way, it allows us to lay the bulkhead down, land these big things, weld them all in different orientations, and then erect it and put it together.

This is the steam generator that will be in the ship. [Deleted.] These two things here are larger reactor coolant pumps. [Deleted.] So, the facility has paid for itself several times over by the problems that we found in advance.

That is the large main turbine complex. [Deleted.]

So, every pump, every component, every steam generator and so on throughout that system will have been run.

The propulsor—[deleted]. The one for the leadship is under construction now.

Mr. Bevill. Is this going to be quieter?

Admiral DeMars. [Deleted.]

So, this development is very significant. We are ahead of anybody else in the world on that. It would be very important in the overall quieting of the submarine.

REACTOR TESTING

The main point in going through all of that is to illustrate that once we test the plant in bits and pieces, we assemble the reactor plant and the engine room in the submarine in the shipyard. Then we bring steam from off-hull to run the plant cold before the reactor goes critical. Then we take the reactor critical, heat it up and run hot ops, meaning we generate steam with the reactor and send the steam back through the engines. We do everything in a very precise test program that is very closely scrutinized by my representatives on scene, and by my headquarters personnel.

When we finally go to sea, we are going to essentially push the full extent of the envelope. The submarine will go to test depth, 100 percent speed and essentially full reactor power. Reactor safety demands that when we go to sea for the first time in the submarine, everything works in accordance with test specifications.

When I think of the fly-before-buy concept, I know that I have a reactor in this ship, and I'm going to make sure that it works properly before it goes to sea for the first time. Our count-down before the initial sea trials is a very demanding thing. The commanding officer reports to me daily by what is going on for the seven or eight days before the sea trial. I arrive on board the night before we go to sea to check for myself [deleted]. We have had about seven different classes of nuclear attack submarines. [Deleted.]

Let me shift gears quickly to answer the question, "Do we continue to need these very high-powered, proficient vessels now that the Soviets have given up, so to speak?"

First of all, it is not clear that they have given up, of course. They still have a very large submarine force, about [deleted] submarines compared to our 130. Their building rate, depending upon the year, is still [deleted].

DECOMMISSIONING SUBMARINES

I mentioned that we are decommissioning submarines. We have decommissioned or are in the process of decommissioning 35 nuclear submarines to date. [Deleted.]

Mr. Bevill. Why is that?

Admiral DeMars. I am not sure.

Mr. Bevill. It doesn't cost that much, does it?

Admiral DeMars. No, sir, it is about 20 million dollars—which is a lot of money, but not in the total scheme of things. They should do it for environmental and safety reasons. I think the Soviets have always had a penchant for not throwing things away. They still have mines from World War II and old tanks. And on and on.

There is no pressure in their system to get rid of things like that. There is some money required to maintain those things.—evidently, they have the ability to defend their budget to do that. But when the Soviets announce they are going to lay up 30 nuclear submarines, they will not really be getting rid of anything that is worthwhile.

Mr. Bevill. That is part of the negotiations?

Admiral DeMars. Yes, they are all nearly 30 years old, the first generation. They are no match for anything, even in their own navy.

Mr. Bevill. So they are giving up nothing?

Admiral DeMars. Absolutely. But set that question aside, and assume that they have given up. The U.S. clearly, I know you understand this, still needs to remain a maritime power. The Soviets are not the only ones that we have to influence and, of course, the history of this country tells us that.

We must be able to deter the large war, as we have done quite well for about four decades, and influence world events of lesser intensity with maritime forces. The question is "Where do submarines fit into that whole thing?" I think if we talk quickly about strategic submarine development, it gives you a hint of where the attack submarine future may be.

The ballistic missile submarine has moved from its place in the sixties as a weak third in the strategic triad to its current clearly preeminent or number one position. The reasons for that basically are stealth, cost-effectiveness and the weapon development.

TRIDENT SUBMARINE

The Trident submarine today is virtually invulnerable at sea. It can't be detected. So that survivability provides crisis ability. It is cost-effective. I think many people tend to focus too much on the original procurement cost, and they don't look at the life cycle cost.

Submarines operate alone for long periods of time, logistically unsupported. They have small crews and their support logistics base is relatively lean compared to other operations. They have low relative life-cycle cost. Today, about 50 percent of the ballistic missiles that are in this country's strategic deterrent arsenal are on ballistic missile submarines. These submarine warheads are supported by only about 25 percent of the Department of Defense's strategic money. So, for about one-quarter of the strategic budget, you get half the strategic deterrent. It really is a cost-effective operation on a life cycle basis. I think that is the important thing to focus on.

Finally, in weapon development, the first submarine missiles were short-range, relatively inaccurate, and low yield. Now, today, we have the D-5, the Trident-II missile that has come through its final development [deleted]. The Trident submarine is in the position to provide very reliable, survivable, cost-effective deterrence.

There are parallels in the development of nuclear-powered attack submarines, I think. They have stealth, as we talked about—we are making them as quiet as we can. They are virtually invisible. You can park it off somebody's coast for months at a time and they can't find it. It can have tremendous impact.

It is cost-effective. Once again, there are small crews, and a lean logistics organization. No escorts are required. They operate alone. Today, we have 89 attack submarines in the country's arsenal and they are supported by only 10 percent of the Navy's budget. That 10 percent of the budget is everything, procurement, life cycle cost, people, and so on.

Cost is not the total thing. We are going to see the greatest growth in potential in weapon development for the submarine in the future. About 10 years ago, the Navy developed cruise missiles, both for use at sea and for land attack. Now submarines can attack ships hundreds of miles away and can also attack land targets hundreds of miles inland with conventional weapons that can hit with an accuracy of about 15 feet after going about four or 500 miles.

That, coupled with other things that can be done [deleted] are going to extend the punch of this vessel. I do believe it will be the capital ship of the next century.

I think, because of our tremendous development, we are going to open up at least a two-decade lead over any other navy in the world when we go to sea in the SSN-21 in 1995.

In conclusion, I would like to once again reiterate this is a complex, demanding, unique program. Why does it work? It works largely because we are different. We have been permitted to do things differently. An Executive Order and Public Law codifies those differences, allows us to be unique, and allows us to have our own style of doing things.

We are under constant pressure to change and adapt, as everybody is. If it doesn't make any difference, or it is only a minor administrative irritant, we will do it. Where it would cause a fundamental change, we will resist it.

We generally are successful because we have the confidence of the Congress and we are always able to point to our record and ask "Why would you want to change the way this organization does things if it has operated this way for the last 35 years, and there is no indication that our operation needs to change?"

I do appreciate your understanding and your continued support to resist any fundamental change in the way we do business. Thank you very much. That finishes my remarks. I will take any questions you might have now, sir.

[The statement of Admiral DeMars appears at the end of the hearing record.]

SSN-21

Mr. **Bevill**. The SSN-21, the submarine of the future, what is the timetable for completion?

Admiral **DeMars**. If all goes well, and of course it never does, we should go to sea in May of 1995. That is what the contract with the Electric Boat Company for the lead ship calls for—that we will be on initial sea trials in May of 1995. Right now, we are on track. We are in the final stages of fuel cell manufacture for the leadship.

These big components are being built all around the country. Electric Boat is bending steel for the hull now. We are on track as of today, but we have five more years to go.

Mr. **Bevill**. The noise of the submarine has always been a challenge. You have made great progress on that, and are doing a great job in so many ways. But you said the SSN-21 could come up the coast, and they wouldn't know it was there. What are you talking about when you say you can't even see it?

Admiral **DeMars**. Meaning that it has little signature to allow detection. You can't hear it, you can't see it, it puts out very few electromagnetic vibrations, it doesn't leave a wake that can be detected.

It is the "stealthiest" platform in the Department of Defense today. And it is a stealth already paid for. With the SSN-21 we are going to produce several orders of magnitude more stealth than that which we have today in the 688 class.

Mr. **Bevill**. [Deleted.] Of course, they have come a long way in the submarine area, too, haven't they?

Admiral **DeMars**. Yes, sir.

Mr. **Bevill**. [Deleted.]

Admiral **DeMars**. We try to say abreast of that, for obvious reasons. One of the advantages is that our at-sea operations place us up against the Soviets regularly and routinely. So we can measure how well we do against the adversary, unlike many other weapons systems. Obviously, we don't fool ourselves about how good or bad we can be.

We have a way of being able to say we are ahead today with some feeling of confidence. But if we don't do things I mentioned, then that margin will shrink in the years ahead. I am reasonably confident that we are ahead today, but as the Soviets continue to bring out their newer submarines, like the AKULA, we will start to lose that undersea superiority margin. SSN-21 will cause us to regain that margin.

Mr. **Bevill**. With or without the anticipated negotiations with the Soviet Union and with Eastern Europe, your work, I think, is still going to be most important. I have always felt that.

Your research, and the weapons research and development are very important. I hope that we can give you the help you need from us to carry on.

As I mentioned the other day, one thing I have always felt kept us ahead of the Soviets is that our scientists are so much better, so much more skilled. We can come up with more new weapons and new ideas faster than the Soviets can steal them, and that is pretty good.

Of course, I think the last setback with one of the Japanese companies gave away the store there for a while.

Admiral **DeMars**. Yes, sir.

Mr. **Bevill**. But I can tell you are moving on.

Admiral **DeMars**. Yes, sir.

IMPACT OF PROPOSED DOD BUDGET REDUCTIONS

Mr. **Bevill**. Would the Naval Reactors Program suffer any repercussions from the proposed reductions in the DOD budget in fiscal year 1991, and the outyears?

Admiral **DeMars**. It will be affected, in two ways. One, the number of reactor compartment disposals that I talked about will be higher than it would have had not this occurred. I think probably the Department was planning on decommissioning maybe six or so submarines. Now the number is eight. I am not sure what the number will be in fiscal year 1992, but it will go up. There is more work there and that takes resources.

Equally important and probably more so is the fact that the overall building rate for new ships and new submarines will be somewhat less than we anticipated before. That causes the vendor base, which is already fragile because I am the only one that builds naval reactors in this country, to be even more fragile and require more care and handling. Those, I think, are the major impacts.

Mr. **Bevill**. Within the past year, the Soviets have lost a nuclear submarine and have had difficulties with others that were noted in the press. Has this had an effect on your program? I think you have touched this. But has it had an effect on your program?

Admiral **DeMars**. Yes, sir. Obviously, as you understand, we operate to completely different standards. However, there are some people in the world that don't understand that, and there are others that choose not to understand it in order to characterize all nuclear submarines at sea as being equally bad.

There is really nothing new that has happened over the last several decades, but as more comes out in the open press about how bad the Soviet nuclear program really is, it will redouble the efforts of these groups that seek to cast all Naval Reactors in the same light.

We are prepared for that, we will just redouble our efforts to continue to convince people that we do things right.

STANDARDIZATION OF REACTOR DESIGN

Mr. **Bevill**. I get the impression from your testimony that you have pretty well standardized your reactors. This panel has been trying to get standardization in the civilian nuclear powerplants for a good many years now. They have been talking about it. Each year, something is going to be done the next year. It has been going on for 20 years.

Mr. **Myers**. As long as we have been here.

Mr. **Bevill**. Yes. But apparently, you are making real headway.

Admiral **DeMars**. Yes, sir, in the propulsion machinery. The changes in the reactor itself are driven largely by different sizes of ships. A carrier needs a different reactor than a cruiser or a large ballistic missile submarine.

Mr. **Bevill**. Will you do the same thing on those?

Admiral **DeMars**. Yes, we try and standardize as much as possible. All of our procedures are generic, such as how we handle radioactivity or certain casualties. Those are standardized across the entire spectrum of reactors.

Our inspection processes are standardized, our reporting processes and so on. So in those things which lend themselves to standardization, you absolutely should do it. It just makes the job easier.

Mr. **Bevill**. The Chair recognizes Mr. Myers.

SSN-21

Mr. **Myers**. Well, thank you, Mr. Chairman. Admiral, this is one of the more fascinating sessions we have every year, trying to keep up with what the Navy is doing or plans to do. What is the difference between the SSN-21 and the Trident submarine we are operating today; the *Tennessee* that you and I took a dive on?

Admiral **DeMars**. If I look at the reactor plants of the two, pushing aside the various different missions, [deleted].

It takes a lot of engineering and a lot of skill in manufacturing and testing to bring things to that point. There is a significant improvement from what we had on Trident to this, because we have about 20 years newer technology.

[Deleted.] We are doing all of it with the same size crew. We have not allowed the crew size to increase. We said we were going to hold the crew size the same, because to a large degree, that drives life cycle costs. We are forcing the designers to design the equipment to be operated by the same size crew.

Mr. **Myers**. With that power density it means you can shoot and scoot. You can get away quicker?

Admiral **DeMars**. Yes. We can get away quicker. We can make that part of the submarine which provides the speed smaller than it is now. Or we could keep it big, but then drag on the hull would make it slower.

Mr. **Myers**. Then the hull will be the same size?

Admiral **DeMars**. No, sir. SSN-21 is smaller then the TRIDENT that we were on. The TRIDENT is 18,500 tons. The SSN-21 will only be 9,150. So it is about half-size. But it doesn't have the missile compartment, of course.

Mr. **Myers**. The main purpose of the submarine is to carry that arms load, isn't it?

Admiral **DeMars**. The way to compare the SSN-21 is between today's attack submarine, which is the SSN-688. I don't have a picture or a model of the Trident that we were on, unfortunately. It is better to compare the 688 and the SSN-21, rather than Trident and SSN-21.

These models are all to scale. This is the Soviet Akula, the best that the Soviets put out today. [Deleted.] So you have significantly increased the weapons load on this submarine.

One other comparison that I think is interesting is that this submarine, SSN-21, [deleted] is no more detectable than SSN-688 is along the pier with the reactor just running, keeping the lights on.

[Deleted.]

That is significant engineering. Also, as I mentioned before, from 688 to 21, the same size crew. So, we are getting much more punch, much more speed, power density, quieting and weapon-carrying capacity, the same size crew and a slightly larger submarine. SSN-688 is 7,000 tons, SSN-21 is 9,000 tons. The Soviet Akula is [deleted] so they cannot package all of that today into the same efficient package.

Mr. **Myers**. I am not sure I understood your response to the question. It is going to be smaller than the 688?

Admiral **DeMars**. No, sir. SSN-21 is smaller than the Trident we were on.

Mr. **Myers**. Okay. As far as weapons on board, will it carry about [deleted] weapons?

Admiral **DeMars**. It will carry [deleted] weapons.

Mr. **Myers**. The Trident II type of weapon?

Admiral **DeMars**. No, torpedoes. It will not fire ballistic missiles. It will carry [deleted] torpedoes or cruise missiles, as opposed to the 688, which carries today [deleted] torpedoes or cruise missiles.

There is a significant increase in the weapons. The 688 has only four torpedo tubes for launchers; SSN-21 will have eight torpedo tubes for launchers. The salvo rate of the torpedo-carried weapons will be much greater.

The real improvements are in the weapon-carrying volume, the power, which gives you the speed, and the quieting. It is several orders of magnitude quieter.

PROTECTING TECHNOLOGY

Mr. **Myers**. It has been several years now since the Russians obtained our technology or part of it anyway. Do we know how successful they have been at reducing their noise and other characteristics?

Admiral **DeMars**. It is difficult to tell. They continue to make their submarines quieter, as we do. So it is difficult to pull out that one particular contribution to it. What they got in the Toshiba-Konigsburg deal is the machines to produce the propellers. They still have to have the plans for what you want to produce to put into the machines. They got part of the manufacturing process, which is not inconsiderable, but they didn't get what you manufacture. [Deleted.]

Mr. **Myers**. Are they up to the Trident technology?

Admiral **DeMars**. No, today the Trident is the quietest submarine in the world.

Mr. **Myers**. [Deleted.]

Admiral **DeMars**. We are as careful as we can be. We have requirements when a submarine is in dry dock—we put a shroud over the propeller so the satellite coming overhead cannot photograph it or somebody riding down the river in a boat cannot photograph it. We are very, very careful in this program, and in the Navy in general, of protecting the technology. It is among the world's most sensitive technologies.

Also, there is a great difference between knowning what you want to do and being able to do it in a manufacturing sense. As you know, the Soviets frequently have problems producing things that take a great amount of care and skill.

Admiral Rickover had the opportunity to walk through the *Lenin,* the nuclear-powered ice-breaker, in 1959. He came back and said, "Protect everything. They don't know how to weld or make sound isolation. They don't know how to make steam valves. We should protect everything." They are just not very good at manufacturing. Our industry is much better at it.

Mr. MYERS. I hope it stays there.

Admiral DEMARS. We hope so. As I said, I have a very fragile industry base right now. There is a reasonable profit to be made there. We need to keep enough people in the business to keep competition up as much as possible.

DECOMMISSIONING NUCLEAR SUBMARINES

Mr. MYERS. How many nuclear-powered submarines have we decommissioned?

Admiral DEMARS. We have decommissioned or are decommissioning 35. One of them, we turned into that Moored Training Ship that I showed you. One of them, the *Nautilus,* is a memorial in Groton, Connecticut. You can go and visit it. The other 32 have all had the fuel removed, and some have had the reactor compartments cut out. The rest, we have to cut the reactor compartments out.

Mr. MYERS. Why do we decommission a submarine?

Admiral DEMARS. Obsolescence, for the most part in the levels of silencing that you can achieve. In our initial submarines, the equipment was [deleted]. We then moved to the *Sturgeon* class that did better, and then to the 688. Decommissioning is largely driven by the inability to further quiet old ships and by the inability to put in more modern sensor systems in the forward end.

Mr. MYERS. Okay.

Admiral DEMARS. [Deleted.] That caused a design change.

We have engineered all the quieting and the increased weapons stowages we can in the 688-class submarines. We have taken it to its limits. We put in all the improvements that we could. There is not any space left. Now, if we have a new idea, we have to take something off for the 688. So we just lost the margin. In order to go this several orders of magnitude greater in quieting, we had to start all over.

We learned a lot since we built 688. The use of high-powered computers and different techniques in designing causes us every now and then to be able to sit down and say, "I can do it better." Airplanes are better now than they were 20 years ago—they don't even look the same.

Mr. MYERS. We are still flying some of those airplanes every weekend.

Admiral DEMARS. The oldest submarines we are decommissioning now are 30 years old.

Mr. MYERS. They have been refueled at least once then?

Admiral DEMARS. Yes, that is something else that I didn't mention in my testimony. The original, the *Nautilus* was refueled after two years. [Deleted.]

Mr. **Myers**. You had the vuegraphs of the carcasses, I will call them, at Hanford. Do they still have the reactor core in them?

Admiral **DeMars**. No, sir. The cores have been pulled out. They have the pressure vessel and the primary coolant loops and the pumps and the valves.

Mr. **Myers**. What do we do with the reactor then?

Admiral **DeMars**. We take the cores out. Those go to the Expended Core Facility in Idaho. They are cut apart and examined to make sure that all the things that we thought would happen to them over the 10 or 15 years in operation were, in fact, close to what did happen. Then they are sent to the Chemical Processing Plant where they are chemically dissolved. [Deleted.] Some of it is reclaimed. That which is not reclaimed is calcined for eventual disposal.

Mr. **Myers**. I have some other questions, but at this point, I yield to Mrs. Boggs.

Mr. **Bevill**. Mrs. Boggs?

Mrs. **Boggs**. I was enjoying your questions.

Mr. **Myers**. I will enjoy your questions for awhile.

Mrs. **Boggs**. Admiral, it is wonderful to have you with us.

Your operation seems to have such a fine safety record and such a fine environmental record. The Energy Department's related nuclear weapons complex doesn't have that kind of record.

What kind of advice can you give us about the types of changes that could be made in DOE's programs that could result in a similar record of accomplishments as the Naval Reactor's?

PROGRAM ACCOMPLISHMENTS

Admiral **DeMars**. That is a very difficult question, and it is also a question I have been asked before. I am not really sure, since the only thing I know very well is how this program operates.

I think the thing that makes this program successful is that we have very dedicated people in it. The staffs are long term. My principal staff section heads have 25 years in government service on the average, all in Naval Reactors. They have come up through the organization so they have been there a long time.

We are very careful in who we select to go out to run the ships or work in the field. I give about 1000 interviews a year to select people for my program. I take many of the finest young people that this country can produce who come out of various colleges and the Naval Academy. We train them hard and oversee them very hard.

We have very tight communications between the headquarters and the field so that I can almost get more information than I would ever want on a daily basis about what is going on on these 176 reactors that I am responsible for.

I think Admiral Watkins understands some of these principles. Actually, I know he does, because he was part of the nuclear Navy. He is trying to implant those into that organization, but it is very difficult. It is a different organization. There is a different tradition that has to be modified, and so I would hesitate to give too much advice about something I don't know very much about, other than to state the few principles that I think are important in any operation.

SAFE TRANSPORT OF NUCLEAR MATERIALS

Mrs. BOGGS. I know that Admiral Rickover was asked by me and other Members of this committee for a long time about the training and qualifying of the operators because it seemed to me that the methods that were used to train and qualify your operators could be shared with the other areas that use the same technologies and are responsible for the same kinds of measures for safety and so on.

I was also very interested in the environmental aspects that you meet with the Environmental Protection Agency for surveys of the U.S. shipyards and bases of the nuclear powered ships. They do seem to confirm that the program operations do not impact upon the public or the environment. That certainly has been the record of your operation.

Also, I notice that in your testimony, you talked about the capital equipment funds and the buying of shipping cask equipment to ensure continued safe transport of the irradiated material.

I wondered if you extended the safe transport operations to include FEMA, the Federal Emergency Management Agency, that, of course, is now coordinating with the various states and waterways, et cetera, so that when there are "hazardous materials," there is some sort of coordinated effort to make certain that the transport continues to be safe through that state.

Admiral DEMARS. I will have to check on that and give you a proper answer for the record.

[The information follows:]

NAVAL REACTORS SHIPMENTS

All of my shipments are made in full compliance with applicable Department of Transportation and Nuclear Regulatory Commission requirements designed to ensure the public's safety. Although it is highly improbable that a transportation accident would be of such a nature as to require Federal response, there are provisions for coordinating Federal action for such an accident through the Federal Radiological Emergency Response Plan—which involves the Federal Emergency Management Agency.

Admiral DEMARS. I know that we live by all the Department of Transportation regulations on shipping containers. We also develop a Safety Analysis Report that we have passed on to the Nuclear Regulatory Commission for all of the shipping containers that we use, and we fulfill NRC requirements.

Mrs. BOGGS. It falls under the old civil defense code.

Admiral DEMARS. Quite frankly, our shipments are so low key and run so well that I am loath to change it excessively, given other organizations' problems in that area.

Mrs. BOGGS. Especially since your laboratory and prototype sites are not only inspected by EPA but by state officials in accordance with the Clean Air Act and the Clean Water Act and others.

Admiral DEMARS. Yes, ma'am.

Mrs. BOGGS. It is very comforting to have you aboard, Admiral.

Admiral DEMARS. Thank you very much.

We were very fortunate early on; Admiral Rickover was an environmentalist before the term was invented in this country. Many of the principles he espoused have stood the test of time. We have not had to rethink the way we do things in the environmental areas as the civilian standards have risen.

Our requirements are still much more demanding than those in the outside world. So they have been, the salvation of the program in that area, those initial principles that were set.

Mrs. BOGGS. Speaking of interagency and interdepartmental cooperation, has the State Department used your operation, your expertise, your knowledge, your splendid manner of presenting programs, in dealing with such sensitive problems as New Zealand, et cetera?

Admiral DEMARS. Yes, they have. We get involved with them to a significant degree in making sure that we can keep access to the ports that we go in overseas under the ground rules that we set up—they depend upon our reputation for safe operation to keep us from giving out any technical details or secrets. [Deleted.] My section head who is responsible for environmental and radiation matters is technical consultant to the London Dumping Convention and we get involved with the State Department on several areas there. We coordinate with them.

Mrs. BOGGS. Thank you very much, Admiral.

Thank you, Mr. Chairman.

THE THRESHER AND THE SCORPION

Mr. BEVILL. I know the record that you have is tremendous. But I think there were two nuclear submarines that sank. Did we have any casualties?

Admiral DEMARS. Yes, sir, we lost all hands on both of those, the *Thresher* and the *Scorpion*. That was in the 1960s.

Mr. MYERS. That wasn't a nuclear accident, was it?

Admiral DEMARS. No, they were not nuclear casualties. We don't know exactly what they were in both cases. We think the loss of the *Thresher* was caused by failures of seawater systems in the engineering plant that didn't directly supply the reactor plant. As a result, *Thresher* couldn't blow ballast tanks.

The *Thresher* casualty caused a signficant change in the way the submarine business is run in the maintenance and the supervision of the seawater systems on a submarine. That is not directly my responsibility now. What the changes involved were tighter controls of procedures, spare parts and repair of any system that is subjected to submergence pressure. Those standards that were set almost 20-plus years ago are still in effect today and stand us in good stead now.

Mr. BEVILL. Were both of them nuclear powered?

Admiral DEMARS. Yes, sir.

Mr. BEVILL. But it wasn't a nuclear accident?

Admiral DEMARS. No, sir.

Mr. BEVILL. You have had no serious nuclear accidents?

Admiral DEMARS. We have never had a nuclear accident in this program and we have never had anything that gives us a significant or measurable, discernible impact on the environment.

Mr. Bevill. Are there any other questions?

Mr. Myers. Yes, I have some.

Speaking about the *Thresher* and *Scorpion*, would the reactors have continued to operate? Was there danger of a meltdown?

Admiral DeMars. No, sir. The reactors are designed to automatically shut themselves down under certain conditions and they did then. They remain on the bottom. We have revisited those sites and monitored to make sure there is no discernible impact on the environment, and there isn't.

NAVAL REACTOR DECOMMISSIONING

Mr. Myers. You speak about retiring reactors. How many have been retired?

Admiral DeMars. Thirty-five.

Mr. Myers. How many are you going to retire in the next two to three years?

Admiral DeMars. In the 1991 budget, eight.

Mr. Myers. All submarines?

Admiral DeMars. Yes, sir. And within the next five years, we will have the first two nuclear cruiser retirements that we have to come through.

We need to keep the pressure on to go through that sort of unglamorous waste disposal thing because that will be an environmental liability unless we keep after it. It is working well now and we will work hard to make sure it continues.

Mr. Myers. We will retire eight. How many will we be commissioning during that period of time?

Admiral DeMars. Three.

Mr. Myers. So it is a losing proposition?

Admiral DeMars. The submarine force will get smaller in the future as well as the rest of the Department of Defense. That is to be expected.

The issues are to maintain the quality of what you have—make sure that you keep the support, the training, the spare parts, those kinds of things adequate for whatever size force results. It will still be a capable force.

We will have a smaller submarine force and a smaller Navy, but there are no indications yet that the Soviets are moving in that direction. There is a lot of talk. They have decommissioned some diesel submarines that were even older than the ones that I talked about. They were 35-plus years old. They have made a lot of propaganda out of that, [deleted].

Mr. Myers. How many are they building?

Admiral DeMars. [Deleted.] In the same time, we built three nuclear submarines. So they out-built us last year [deleted].

We have never thought that the specific numbers were as important as the quality. That argument gets thinner as your numbers get lighter and lighter, but we still have a significant quality advantage over the Soviets, meaning we are quieter than them and we can hear them much farther away than they can hear us.

Mr. Myers. General Custer thought that at Little Big Horn, too.

Admiral **DeMars**. Yes, but he didn't have stealth and he wasn't spending as much resources. And plus, we know more about our Indians than he did about his.

It is a quality business. It is an undersea technology race that we need to stay in. Our new submarine will keep us in that. It is very important, especially as the submarine force will get smaller. Hopefully it will stay as professional as it is today and the equipment will be significantly better than the opponents'.

Mr. **Myers**. [Deleted.]

Admiral **DeMars**. [Deleted.]

Mr. **Bevill**. [Deleted.]

Admiral **DeMars**. [Deleted.]

Mr. **Myers**. How many nuclear submarines do they have in their inventory now?

Admiral **DeMars**. About [deleted] nuclear submarines.

Mr. **Myers**. There is not that much difference then?

Admiral **DeMars**. We have about 130 nuclear submarines. They also have about another [deleted] or so modern diesel submarines—we have none.

What they are doing with this high building rate is modernizing their force. That is the danger.

If they get smaller, that is not all that significant because they are building newer, more capable platforms and replacing older ones that are not very capable.

Mr. **Myers**. I have asked you and your predecessor this question before. While we are retiring and decommissioning these nuclear-powered submarines, the nuclear reactor, I guess, is still operational if you would want to refuel it. How much electric power are they capable of generating, the ones that are retired?

Admiral **DeMars**. [Deleted.] It is not a lot compared to the sort of power generation that you need to do things like light cities.

COMMERCIAL NUCLEAR POWER

Mr. **Myers**. What I am thinking of is American Samoa where practically all of their generation is from diesel, and very expensive. There are some other islands in the Pacific where it is very expensive for their power generation. Instead of cutting these ships up, couldn't we put them in the harbor, put a skeleton crew on them and generate the power?

Admiral **DeMars**. No. It really wouldn't be cost effective because you can't put a skeleton crew on these things. In other words, the demands of reactor safety require that you have a full engineering crew that can stand a three-section watch and keep the plant running. Then you have to have people in the rest of the thing to keep it from sinking even though it is alongside the pier.

There are a number of people there—that are significantly more than you have in a non-nuclear commercial plant. You can build a very large, a very efficient diesel generation plant—that can operate with fewer people.

The Naval plants are also built to significantly different specifications than commercial nuclear power plants. For instance, a commercial nuclear power plant is built to withstand about two Gs of acceleration for earthquake requirements. The Naval plants are [deleted] of shock damage, for warfighting. Commercial plants are designed to go up to 100 percent power and stay at that for long periods of time. That is most efficient—but they refuel a third of the core every year. Naval plants are designed to maneuver up and down because they are war ships. We want to keep from refueling as long as possible. So if you are trying to take that approach and put it in this different operation, even if it were feasible from a reactor safeguard [deleted] standpoint it would be terribly inefficient.

ALTERNATIVE CONCEPTS

Mr. MYERS. Have you given up on the breeder concept entirely?

Admiral DEMARS. Yes, sir, under our civilian hat we developed light-water breeder reactor technology. It is on the shelf now ready to use.

Mr. MYERS. How about the HTGR? Any consideration at all?

Admiral DEMARS. We have been looking, as we always have, at alternate cycles other than the pressurized water plants. There is no indication now that there is any driving imperative to move to a different cycle. Neither the gas nor the liquid metal would give us a better warship. We haven't given up on it. We are still looking at it.

[Deleted.]

Mr. MYERS. When the HTGR people appeared before us, all the things you are saying you need, they are saying they have already inherent in their equipment: size, safety, and efficiency.

Admiral DEMARS. The difference there is that I understand the application in which we would use high-temperature gas reactors. They don't understand the application in which Naval Reactors are employed. They operate in a completely different power regime.

High-temperature gas reactors are large, they are bulky, usually made out of graphite and so on. Graphite would not pass the shock requirements for the Navy. So we buy into new materials development to try to do that.

Also, the power density is completely different. They are not very power dense; they are very big.

Mr. MYERS. They keep telling us they are small.

Admiral DEMARS. But in comparison to the submarine reactor, they are still big. They may be small in comparison to what they are used to using. But to squeeze it down to put it in a submarine—they are still very large. It would take a significant material development program to use high-temperature gas. We have a low key materials effort going on now. We have to get into high temperature, high strength materials. Carbon would not do it. Most HTGRs are carbon based reactor plants. That doesn't pass the shock test for Naval use.

RADIATION EXPOSURE STUDIES

Mr. MYERS. On one of your graphs you showed graphically the man-rems per year.

Admiral DEMARS. Yes, sir. Total man-rem.

Mr. MYERS. During the 1964 to 1967 period, it was very high compared to the number of ships. Do you have any follow-up on the crews who served on the ships at that time about the incidence of cancer?

Admiral **DeMars**. We have had several follow-ups and epidemiology studies which show there is no correlation. Even in those days when the total was high, the exposure that each man received was still this low limit that I mentioned before.

In other words, we would have maybe a welder doing a job and two supervisors standing there watching him. So these two supervisors were getting low-level doses in addition to the welder. You add all of that up, it was high.

So we developed different procedures. We required mock-ups to be developed. Let's have a valve outside the reactor and have the welder practice on that. Certify him on that and then he goes in and makes the weld and the inspector doesn't watch. Then the inspector goes in afterwards and inspects.

So even in those days, the individuals were not getting excessive doses; it is just that there were more of them getting small doses.

Mr. **Myers**. So there are no problems with the Navy crews on board?

Admiral **DeMars**. No, sir. That was a scare. We have had several epidemiology studies that stretch back many years. We have one that was done, but the report has not been published yet, by Yale University where we tracked people back for the number of years that they have been on the submarine service and can find no correlation to show that there is a health concern associated with these reactors.

We designed the reactors and their shielding very conservatively. The crews go away and essentially live next to these reactors for two, two-and-a-half months at a time. We have to design the shielding so it is very conservative, so nobody even approaches the limits. You get more radiation flying coast-to-coast in an airplane from cosmic radiation than you do living on a submarine with a nuclear reactor because an airplane doesn't shield you from the cosmic radiation. We shield them from the reactor radiation on the submarine.

Mr. **Myers**. You mentioned that cobalt is in the eight units you have stored. Is that alpha radiation?

Admiral **DeMars**. No, sir. Beta and gamma.

Mr. **Myers**. Gamma, too?

Admiral **DeMars**. We still keep the lead in there. In other words, when we take the fuel out of the reactor compartment, the lead in the reactor compartment remains there so that the hull itself will not be the environmental liability. Now, we may in the future, maybe 100 years from now, go in and take the lead out.

Mr. **Myers**. Cobalt is used in some cancer treatment today. It doesn't cause cancer; it is sometimes used in treatment.

One last observation here. We are constantly trying to improve the submarines in many, many ways. How many people do you actually have working on research for the submarine power system? What is the lead time working on research?

Admiral **DeMars**. You mean for the next submarine plant? We are working today on what the next submarine plant might be from our standpoint—looking at what can we do in the reactor.

If you are ready to go and you have your funding and all that, it takes you about 12 years. If you really could cut through the red tape, you could do it in 10 years from your basic idea to putting the ship in the water.

Mr. **Myers**. That is after you have the concept. But I am talking about lead time in research.

RESEARCH AND DEVELOPMENT

Admiral **DeMars**. We are always doing that. I have two DOE labs, one in Pittsburgh and one at Schenectady. They are constantly doing basic research in reactors. I direct them—they don't work for anybody else. They only work for me and they only do what I tell them to do. They send me regular reports. My staff and I visit and so forth. The labs are working on concepts to improve the pressurized water reactors. They are working on concepts to make the chemistry better and working on materials concepts to try to reduce some of the materials, Cobalt, for instance, that give us the high radiation after you are done with the reactor.

They are working on new steam generators. They are working on all sorts of things.

When we start to finish up this reactor plant, then we will try to focus on what might the next plant be like and where we want to turn up the burner on this research and begin to pull it together so we can have things ready to go.

If somebody said, "Next week, DeMars, here is an amount of money, go build another submarine plant," I would be ready to go in a week. I know what I want to do. So we are always ready.

The next one would be a pressurized water plant. The improvements would be in more power density and possibly some simplification, if we could come up with some schemes to try and do away with some of the pipes and valves we have nowadays. But basically more power density.

Mr. **Myers**. Power density then is not necessarily more speed, but it could be a smaller plant to get the same speed?

Admiral **DeMars**. You can spin it any way you want. If I could give you a denser power plant, you could tell me how much power you wanted, and I could give you a smaller reactor—that means you can either carry more weapons in the same size submarine or make the submarine smaller, or you can make the hull thicker and it can go deeper.

It just means that out of the total weight of the submarine, a smaller percentage goes toward propulsion. So we take up less room to do our job.

You can spend that advantage how you want. You can make a bigger submarine, you can make it go deeper or faster or smaller. If I can give you an engine for a car that is a third smaller than the one you have got, you can either choose to have a bigger car or a smaller car or have the same size engine and go faster because it has more power. Any different way you want.

SUBMARINE CREWS

Mr. Myers. I guess, going back to my experience on board that submarine, is the crew still a limitation? The crew is the biggest problem, isn't it? Is that the reason we have a gold and blue crew?

Admiral DeMars. We only have that on the strategic submarines.

Mr. Myers. Why?

Admiral DeMars. Because they are strategic deterrent submarines, it is more cost efficient if you maximize their time at sea. In the total lifetime of a Trident submarine, it will spend about 70 percent of the time at sea. The previous strategic submarines spend about 62 percent. Because of improved technology and a number of different things, we can keep the submarines at sea most of the time.

In order to maintain the needed tempo when it is in port, we need people to repair things and maintain the ship. We could not keep up tempo with one crew. It would just wear them out. It is hard work.

When you are at sea, you are six hours on watch and 12 hours off and everyone stands watch. There are no idlers. When you are in port, everybody is working. So it is mostly to keep the submarine at sea that we use two crews.

The tempo for the attack submarines is a little different. It is a little more varied. So one crew is all we can afford for those.

Mr. Myers. Okay. Thank you very much.

Admiral DeMars. Yes, sir.

CRUISE MISSILES

Mr. Bevill. When you talk about cruise missiles, you are talking about using another type of torpedo tube or are you talking about something that goes on the surface?

Admiral DeMars. It can be launched out of a torpedo tube or the 688 class can launch it from some vertical launchers in the bow. It is torpedo tube size. It gets shot out, floats up to the surface and then the engine lights off and it flies supersonic at——

Mr. Bevill. Above the surface of the water?

Admiral DeMars. Above. [Deleted.]

Mr. Bevill. All right.

Mr. Myers. Mr. Chairman, have we solved all the problems with the Trident II weapon?

Admiral DeMars. Yes, sir, it is all done. They finished the last seven shots—once again, it is not my exact responsibility, but the last seven shots have been successful. Everybody has signed off that it is now operational. It will be loaded out of the USS *Tennessee* and go on the first patrol on [deleted] which is four months late in an eight-year development program.

Mr. Myers. Not bad for government work, is it?

Admiral DeMars. No, sir, it is not bad at all.

Mrs. Boggs. Mr. Chairman, I have a curiosity question.

Mr. Myers. We have all had that all morning.

Mrs. Boggs. De we know how many and what kind of submersible vehicles the Soviets are using in Scandanavia and the Gulf?

Admiral **DeMars**. [Deleted] [Deleted.]—one submarine went on the rocks there. [Deleted.]

Mrs. **Boggs**. When they talk about the very small types of submarines, what are those?

Admiral **DeMars**. [Deleted.]

Mrs. **Boggs**. Any notion of why the Soviets would want to [deleted].

Admiral **DeMars**. [DELETED.]

Mrs. **Boggs**. Do we have a similar operation?

Admiral **DeMars**. [Deleted.]

Mrs. **Boggs**. I am interested in Sweden's military capabilities. [Deleted.]

Thank you.

STEALTH TECHNOLOGY

Mr. **Myers**. While we are on that, you commented about the stealth capabilities of submarines. Sonars, of course, pick up noise from both the propulsion system with the reactor and also from the propellers.

Can't you pick up the metal? Isn't that a detection problem, also, the bulk of the submarines?

Admiral **DeMars**. Passively, no. Actively, if I make an active "ping" or echo range, then I can bounce noise off the submarine, have it return and then I can get a detection.

What we do to prevent that is to put coatings on the submarines. Both the Soviets do and we do. They are rubber composite coatings that deaden that active sound reverberation.

Mr. **Myers**. It is like radar bouncing off your car when you are speeding.

Admiral **DeMars**. We coat the submarines with thick rubber coatings to reduce that bounce.

Mr. **Myers**. You mean if we put that on a car, the radar would bounce off?

Admiral **DeMars**. Yes, sir. But I think the radar frequencies are such that we would need four or five feet of rubber, so you are liable to tip your hand there.

Mr. **Bevill**. Well, Admiral, you can see we have taken a lot of interest in your testimony. Actually, you are still the highlight of the year.

We appreciate the fine work that you and your people are doing.

Mrs. **Boggs**. Hear, hear.

Admiral **DeMars**. Thank you very much.

Mr. **Bevill**. We now stand adjourned until 10:00 in the morning.

[The questions and answers for the record and the statement of Admiral **DeMars** follows:]

SOVIET AND U.S. SUBMARINE SAFETY

Mr. Bevill: Within the past year, the Soviets have lost a nuclear submarine and have had difficulties with others that were noted in the press. Could you briefly highlight your program's record on performance, reliability, and safety? How does this compare to the Soviet record? Have the Soviet's problems had an effect on your program?

ADM DeMars: My program has an excellent safety and performance record -- over 81 million miles steamed in over 40 years without a reactor accident or any release of radioactivity which has had a significant effect on the crews, the public, or the environment. [Deleted]

[Deleted]

While some of the things the Soviets have done may make for exciting claims by those who say we are not competing well in technical advances, [Deleted] I think this is due to the fact that when you have little practical experience in this area, and no responsibility for the outcome of your proposals, it is much easier to claim a vision of the future than test those ideas against the reality of the demanding environment these ships and their crews must face.

I certainly do not welcome Soviet problems in nuclear propulsion. They don't make my job any easier. Their problems do reinforce, however, the importance in this business of conservative engineering, tough standards in the selection and training of plant operators and an uncompromising approach to technical discipline. I have no intention of letting budget pressures or the siren call of untried technologies unravel our deliberate, proven approach to nuclear propulsion particularly since it has not only given us safe ships but also ones that can defeat our potential enemies.

CONTINUING NEED FOR NUCLEAR SUBMARINES

Mr. Bevill: Will we still need nuclear submarines in the changing defense climate facing the U.S.?

ADM DeMars: Yes, sir. Submarines possess a unique capability to exert tremendous political and military leverage by their actual or perceived presence. They are one of our best platforms for many peacetime or wartime missions where covertness is important. Nuclear power remains our only viable means to give our submarines the ability to conduct sustained operations throughout the world as required by our national interests.

The recent political changes in the Eastern Bloc have not significantly reduced Soviet military strength. We can't assume the potential threat from the Soviet Union is gone -- the Soviets still have an enormous and formidable military force.

Another possible outcome of the apparent dissolution of the Eastern Bloc is a resurgence of nationalism and increased complexity in international relations as the world departs from the two power structure of the past forty years. A strong Navy, including a strong submarine force, provides unparalleled flexibility in our ability to respond to rapid world-wide political and military change.

Mr. Bevill: What roles can nuclear submarines play in low intensity conflicts?

ADM DeMars: The role of nuclear submarines in low intensity conflict would include most of the same missions as in high intensity conflict: [Deleted] The submarine's importance in low intensity conflict is actually enhanced. Recall the Falklands War where the Argentines kept their fleet in port in response to the British nuclear submarine threat. Nuclear submarines can also remain on station undetected for long periods, selectively choosing when and where to engage the enemy at minimal risk to themselves, should our leadership desire a measured response.

U.S. AND SOVIET SUBMARINE DEVELOPMENTS

Mr. Bevill: Please update the Committee on the relative capabilities of the United States' and the Soviet Union's submarine fleets and indicate how they have changed in the past year.

ADM DeMars: [Deleted]

Mr. Bevill: What are the Soviets concentrating on as they attempt to improve their fleet? Can you see a change in emphasis in the Soviet program which may be a result of the recent political changes in that country?

ADM DeMars: [Deleted]

I don't expect that the recent political changes in the Soviet Union will alter these efforts, though the potential exists for reductions in Soviet defense spending which would delay their effort. I can't predict what programs might be delayed or for how long. I expect there will be little change in the near-term.

IMPACT OF DEFENSE BUDGET REDUCTIONS ON NAVAL REACTORS

Mr. Bevill: Will the Naval Reactors Program suffer any repercussions from the proposed reductions in the DOD budgets in FY 1991 and the outyears?

ADM DeMars: The Program has already felt some impact. As part of reducing force levels, a number of nuclear powered ships will be retired early and various budgets have been reduced to cut costs. Outyear projections are questionable given the existing uncertainties. We've had to reduce our vendor base and shutdown some facilities to make ends meet.

DISPOSITION OF REACTOR PLANTS FROM DECOMMISSIONED SUBMARINES

Mr. Bevill: What is the current status on disposing of the reactor plants from decommissioned nuclear powered ships?

ADM DeMars: Four submarine reactor compartments were shipped to DOE's Hanford Site during 1989. We have had a very forthright and effective working relationship with the States of Washington and Oregon and the regional Environmental Protection Agency. We have committed the resources to make sure these shipments meet all requirements and are being done so as to provide maximum protection to the public.

Congress has approved funds to start eight more disposals in FY 1990. The Navy budget request includes funds for six more in FY 1991. I encourage your continued support of this requirement. It demonstrates that we are able to properly manage our "cradle-to-grave" responsibilities despite the complexities surrounding disposal of waste.

Mr. Bevill: Are the Soviets decommissioning submarines as fast as we are? Does this make them weaker or stronger?

ADM DeMars: [Deleted]

NAVAL REACTORS' VENDOR BASE

Mr. Bevill: Has your vendor base been impacted by the stalled commercial nuclear industry?

ADM DeMars: Though our work is different than commercial nuclear work, the technologies and quality control requirements are similar. Thus the absence of a vibrant commercial nuclear market hurts because Naval nuclear vendors have no viable alternative business to preserve them as nuclear component vendors if Naval business becomes insufficient.

Mr. Bevill: The Committee was disappointed by the decision last year to place in standby the Naval Fuel Materials Facility at Savannah River after spending $176M on construction. Would you please explain the circumstances leading to this decision?

ADM DeMars: Several factors weighed heavily in my decision to place the fuel factory in standby -- the Navy's nuclear shipbuilding program was cut back, and improved core technology and manufacturing improvements are allowing us to build longer lasting cores thus reducing the number we need to buy. All of our needs for fuel production now can be met by Nuclear Fuel Services Company -- they are the only manufacturer qualified to make all the types of fuel we need. We will also save more in two years by putting the Savannah River factory in standby than it cost to build the plant.

NAVAL REACTORS' FUEL REQUIREMENT

Mr. Bevill: Does the funding request in the Materials Production Program for Naval Reactors fuel reflect the current requirements for FY 1991? If this request is reduced, would production be impacted?

ADM DeMars: The FY 1991 budget assumed that enriched uranium requirements were 3.8 metric tons per year in FYs 1990 and 1991. There is currently no requirement for enriched uranium in FY 1990. The current FY 1991 estimate is 2.6 metric tons. The FY 1990 reprogramming for Defense Programs reflects the variable cost savings which could be made after paying the fixed costs and costs associated with operating the diffusion plants at a minimum level. I am currently evaluating the most efficient method of meeting the FY 1991 requirements. I expect an adjustment to the FY 1991 budget to be submitted shortly.

Mr. Bevill: Is there a reserve inventory of fuel? If so, what is the size of this inventory?

ADM DeMars: By the end of FY 1991 we anticipate that our inventory of material from the enrichment facility will be about three months worth of fuel production requirements.

ADVANCED FLEET REACTOR AND SSN 21

Mr. Bevill: What is the status of the Advanced Fleet Reactor? Is work proceeding to your satisfaction? When will it be installed and tested in a land-based prototype?

ADM DeMars: Work is proceeding well. [Deleted]

Mr. Bevill: There has been discussion in the past that SSN 21 improvements are "bells and whistles" and that the SSN 688's are good enough. What is your response to this criticism?

ADM DeMars: The SSN 688 is a fine ship capable of handling a wide range of missions and dealing with all existing foreign classes of submarines. We have made upgrades to add capabilities like the vertical launch system to improve later ships in the class. However, submarine technology continues to evolve, and hull size prevents further improvements to the SSN 688 class. Therefore, we need an entirely new submarine to stay ahead of potential opponents.

[Deleted]

ADVANCED REACTOR DEVELOPMENTS

Mr. Bevill: How long do current fuels last? What are your target life spans for the fuels you are currently developing?

ADM DeMars: Current reactor cores have a nominal life expectancy of about 15-20 years depending on operating tempo and conditions. In a ship with a planned 30 year life, this means you have to perform at least one refueling. [Deleted]

Mr. Bevill: Please describe the Advanced Performance Experimental Reactor.

ADM DeMars: This reactor plant will embody the improvements in our nuclear technology over the next several years. A ship using this plant would not be ready for at least ten years after SSN 21.

Mr. Bevill: Please update the Committee on advances being made in the areas of fuel, cladding, and core design. What other types of advanced reactor technologies are you currently reviewing for possible use in the mid to long-term?

ADM DeMars: [Deleted]

We are also developing the new concept steam generator, [Deleted].

Another long-term development effort centers on alternate cycles.

Mr. Bevill: Your statement mentioned work being done on the feasibility of alternate cycles for naval applications. What do you mean by that?

ADM DeMars: We use this term to mean different primary coolants or different means of converting reactor heat to propulsion power. Since the early days of the Naval Nuclear Propulsion Program, we have investigated alternate reactor concepts -- for example, a liquid metal reactor initially powered our second nuclear powered submarine SEAWOLF -- and we have tried alternate power conversion techniques such as an electric propulsion motor powered by the reactor. To date, we have concluded that a pressurized water reactor driving a steam plant was the best means to combine operational effectiveness with safety, maintainability, and reliability. [Deleted]

As I noted in my statement, the key question we have to ask of any technically promising alternative is whether it will lead to a better ship. Many systems work well or theoretically would work well in land-based or space-based reactors but are not feasible for putting in a submarine hull primarily due to size and ruggedness constraints. We must bear in mind these ships are intended for combat. We have a long way to go before an alternate cycle is fully assessed and an even longer time before such a cycle could be deployed in a warship.

I'm taking the steps necessary to ensure we do not overlook any reasonable opportunity to make a better ship.

CAPITAL EQUIPMENT

Mr. Bevill: How much of your capital equipment funding is for computer equipment? Please list, by site, the equipment to be purchased.

ADM DeMars: About half of my FY 1991 capital equipment request will be spent on computer items. This amount is split about equally between Bettis and Knolls. Bettis' requirements include a memory and storage upgrade for the Information Management Technical support system and an upgrade to increase data processing throughput and speed up memory access on the lab's principal computer. Knolls also needs the principal computer upgrade and needs various minor items such as computer workstations and networking equipment.

PROTOTYPE PLANTS AND MOORED TRAINING SHIPS

Mr. Bevill: You have retired a prototype plant and your budget states another one is nearing retirement. Will you still have enough plants for R&D work and training for Navy operators?

ADM DeMars: Yes, sir. The S1W plant we retired and the S3G plant coming up for retirement are old and their R&D value doesn't outweigh the cost of maintaining them. The remaining plants give us enough test beds for new cores, systems, and components. However, the average age of the remaining plants is about 26 years, excluding the relatively new S8G plant. So in the not too distant future, given design and construction lead time, we will need a new plant to ensure long term test facilities. The Moored Training Ship will take up the slack for training due to the retirement of the S1W plant.

Mr. Bevill: Last year you told us about the Moored Training Ship. Have you started training on it? Will you build more of them?

ADM DeMars: The first class reported to the Nuclear Power Training Unit in Charleston, South Carolina in July 1989 and began watchstanding in the first Moored Training Ship in January 1990.

We plan to convert more ships as necessary to meet training requirements. The fiscal year 1990 defense budget funds conversion of the second Moored Training Ship. Two additional conversions are planned.

Mr. Bevill: What happens to the S1W prototype after it has been defueled and inactivated?

ADM DeMars: We will seal the reactor plant and leave it in place. The Naval Reactors Facility will continue as a key program activity with two operating prototype plants and the Expended Core Facility.

Mr. Bevill: Can you provide the Committee with a schedule of the prototype maintenance and refueling activities?

ADM DeMars: Yes, sir. I'll attach one for the record. [Deleted]

RECRUITMENT AND RETENTION

Mr. Bevill: How are you doing in recruitment and retention of nuclear-trained personnel?

ADM DeMars: The Selective Reenlistment Bonus is a significant factor in enlisted retention and I hope you will continue to support it. Even with the financial incentive the Bonus provides, my enlisted retention is lower than I would like due to a strong civilian job market. Officer retention, down over the past two years, is improving following the bonus and sub pay increases authorized by Congress in 1987 and 1988.

Enlisted recruitment is meeting established goals. Officer recruitment is running, on average, about 10% lower each year than I'd like. This translates to even longer sea tours which tends to hurt retention.

ENVIRONMENTAL STATUS

Mr. Bevill: Are Naval Reactors laboratories and prototype sites exempt from environmental laws and regulations?

ADM DeMars: Naval Reactors laboratories and prototype sites comply with all applicable environmental laws and regulations. We have no exemptions. My sites are regularly monitored and inspected by state and federal regulatory agencies like the Environmental Protection Agency. Inspectors have been granted security clearances by Naval Reactors, permitting them to enter areas within the security boundaries of the sites to enable them to conduct their work. Over the past ten years, we have received over 100 regulatory inspections from state and federal agencies under the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act. None of these inspections found any significant areas of non-compliance, no site has been fined or penalized for non-compliance, and no regulatory agency has sought a consent order or filed suit against any site.

Under the Comprehensive Environmental Response, Compensation and Liability Act, and its Superfund Amendments and Reauthorization Act of 1986, all Naval Reactors sites submitted Preliminary Assessments describing site environmental conditions to the EPA in April 1988. The analyses in these Assessments demonstrate that none of the sites has any contamination or problems of a magnitude to qualify it for inclusion on the Superfund National Priorities List of sites requiring federal attention for remediation. The law provides that the applicable state will determine whether remediation of any part of a site is required, my sites are cooperating with state authorities to enable them to make these determinations. That cooperation includes granting security clearances and affording state personnel access to the site and to classified and controlled information as appropriate to allow them to fulfill their regulatory responsibilities.

Mr. Bevill: Are there existing environmental problems at any Naval Reactors' sites which will require significant funding for cleanup in the future?

ADM DeMars: Other than for an old nuclear weapons program facility, the Separations Process Research Unit, which was operated at the Knolls laboratory before it became exclusively dedicated to Naval nuclear work, I require no funding for remediation efforts outside my level budget. The Separations Process Research Unit is included in DOE's Defense Facility and Decommissioning Program for funding.

Mr. Bevill: What types of environment, health and safety activities are included in this budget request?

ADM DeMars: Most of the environmental, health, and safety effort included in my budget is devoted to maintaining our high standards on a day-to-day basis -- keeping things safe by cleaning up as we go. Other than the Separations Process Research Unit, I have some rather straightforward remedial efforts -- for example, removing underground storage tanks and removing asbestos and PCB containing equipment.

Mr. Bevill: The local media in Schenectady, New York has reported safety and environmental issues at the Knolls Atomic Power Laboratory. What is the situation at that site?

ADM DeMars: Reports of problems at KAPL have focused on allegations that KAPL is not properly managing facilities contaminated by previous operations, that General Electric, the contractor at KAPL has retaliated against employees who have reported safety concerns, and that KAPL has unreported cases of overexposure to radiation.

The media attention has generated some Congressional interest and the General Accounting Office is up there now. My hope is their review will put the issues to rest for good. However, even a favorable GAO report may not put these issues to rest as they seem to have acquired a life of their own.

I certainly support protecting people who bring forward health or safety concerns. This has been an essential part of the technical discipline in the Naval Reactors program since its inception. However, some balance is needed to discourage frivolous allegations -- a half-truth, like a half-brick, can be thrown further. I suggest that a whistleblower be required to submit his complaint in writing and include a certification that it is correct to the best of his knowledge or belief to separate the wheat from the chaff.

USE OF CONSULTANTS FOR GOVERNMENT WORK

Mr. Bevill: There has been criticism in some quarters for the excessive reliance on consultants to perform government functions. To what extent are consultants used in the Naval Reactors program?

ADM DeMars: As a long-standing policy, Naval Reactors does not use consultants for Program work.

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THE HOUSE COMMITTEE ON APPROPRIATIONS

STATEMENT OF

ADMIRAL BRUCE DeMARS, U.S. NAVY

DIRECTOR, NAVAL NUCLEAR PROPULSION

BEFORE THE

SUBCOMMITTEE ON

ENERGY AND WATER DEVELOPMENT

OF THE

HOUSE COMMITTEE ON APPROPRIATIONS

14 MARCH 1990

NOT FOR PUBLICATION UNTIL RELEASED
BY THE HOUSE COMMITTEE ON APPROPRIATIONS

Statement of Admiral Bruce DeMars
Director, Naval Nuclear Propulsion
Department of Energy
FY 1991 Appropriation Hearings

The major thrust of the Naval Nuclear Propulsion Program remains ensuring the safe and effective operation of 178 reactors in 147 ships -- about 40% of the Navy's major combatants -- and eight shore-based, R&D and training reactors. This is the largest nuclear power program in the Western world. These ships have steamed over 81 million miles -- about 3600 reactor years -- without a reactor accident or any release of radioactivity which has had a significant effect on the crew, the public, or the environment. In large measure, this record is the reason we can man our nuclear-powered warships and the basis upon which they are able to enter over 150 ports in the U.S. and abroad.

The program's safety record didn't just happen. It is the result of hard work and dedication. Success requires a broad-based effort in developing nuclear power technology, training and qualifying the operators, providing adequate logistics and technical support, and ensuring the program's high standards are upheld throughout the organization.

In 1989, I interviewed over 1,000 candidates for nuclear service as part of the effort to ensure those who were selected are the best available. We train about 3,000 officers and enlisted operators each year to exacting standards. This includes training on real reactor plants - a fundamental program principle which instills respect for and understanding of nuclear power, as no other way can.

Nuclear technology is uncompromising. To provide for safe operations of the plants, I must spend considerable resources on logistics and technical support at every stage.

The key to success is maintaining close technical surveillance over the work. The program performs hundreds of audits each year to ensure the fleet, the shipyards and the contractors who do naval nuclear work adhere to our high standards. The headquarters organization which oversees these operations also has the technical competence to analyze and deal with problems that arise.

PROGRAM ENVIRONMENTAL RECORD

The program recognized early on the importance of protecting the environment. The record shows the pay-off:

- Since 1967, no radiation exposures above the federal limit of five rem per year which was not established until 1987. No exposures have been greater than two rem for the last ten years. About 97% of the occupational radiation workers received less than .5 rem -- the limit allowed by Federal regulations for a member of the general public.

- Total radiation exposure and radioactive waste from our ships and shipyards are down by a factor of four since the 1960's, though the number of nuclear powered ships has doubled and we have a much heavier load of overhaul work.

- Radiation exposure to the surrounding public due to current operations at the program's DOE facilities is too small to be measured. The maximum possible annual radiation dose, using conservative assumptions, is less than one would get from natural sources in just two days.

- Total radioactivity released from all the ships and program sites together ranks very near the bottom of the list of releases by individual civilian nuclear power plant sites, each operating within Nuclear Regulatory Commission standards.

We report annually to Congress the effects of nuclear-powered ship operations on personnel and make these reports available to the public (copies attached). Environmental Protection Agency (EPA) surveys of U.S. shipyards and bases where nuclear powered ships are present confirm that program operations do not impact the public or the environment. The EPA reports are also available to the public.

For many years, the program's laboratories and prototype sites have also performed environmental monitoring to ensure these facilities are being operated in accordance with applicable standards. The program's environmental practices meet, and are often stricter than, the requirements of applicable laws and regulations. The monitoring confirms compliance with environmental standards, in most cases by a significant margin. These results are published annually and provided to Federal, State, and local officials.

The program's laboratory and prototype sites are also inspected by EPA and State officials in accordance with the Clean Air Act, the Resource Conservation and Recovery Act, and the Clean Water Act. These inspections have found no significant problems. None of these sites are on the EPA's National Priority List for clean-up.

In recent years, concerns over the environmental effects of nuclear reactor operations have heightened public awareness and rightfully so -- nuclear technology requires special care. To date, Congressional initiatives to deal with these concerns have been sensitive to the unique nature of the Naval Nuclear Propulsion Program by providing the latitude for us to preserve the procedures and practices that have led to the program's success. I will continue to need your support in this effort.

IMPORTANCE OF NUCLEAR POWERED SHIPS

Being a maritime nation, the United States will always need a strong Navy. Regardless of numbers, nuclear powered ships will continue to be the backbone of that fleet.

I welcome progress toward a less threatening world, but it is important to stay focused on Soviet capabilities while taking heart at their stated intentions. While the Soviets have stated plans to take operational nuclear submarines out of service, we know of no real action so far. Meanwhile, the

U.S. has retired thirty-five nuclear powered submarines over the past ten years, with nine more scheduled for inactivation in 1991. The Soviets are also continuing an aggressive submarine building program -- nine launched last year (five nuclear and four diesel) vice three U.S. submarines.

There is a tendency in some quarters, particularly when the money is tight, to discount the importance of nuclear powered submarines in a lower-threat environment. Actually, they become more important because they provide so much flexibility and firepower for the money:

- With a crew of only 130, a submarine can operate alone and unsupported for months in harsh and hostile environments anywhere in the world -- even under the Arctic ice.

- Each submarine is independently capable of a variety of missions, including -- with the Tomahawk missile -- the ability to project power ashore surgically and without warning -- a bolt out of the blue.

- Stealth is their forte -- a stealth already paid for. They can remain undetected or announce their presence, as circumstances dictate, increasing the low intensity conflict options available to decision makers.

- Our nuclear submarines have the highest offense-to-defense ratio of any maritime platform. It is all punch. The ocean depths and laws of physics provide the submarine with its own natural defense.

Nuclear-powered aircraft carriers also provide an effective way to protect U.S. interests world-wide while avoiding the entanglements and uncertainties of air field availability and troop basing on foreign soil. The large, multi-purpose, air wings on these ships provide a means to significantly influence events. Nuclear power gives these ships unparalleled mobility while carrying larger supplies of aviation fuel and munitions, and fuel for conventionally powered escort ships. When accompanied by nuclear powered cruisers the mobility and effectiveness of the battle group is even greater.

The TRIDENT submarine with the D-5 missile has made the sea-based leg preeminent in the strategic deterrent triad. Nuclear power in these submarines provides the foundation for the stealth which yields the survivability and therefore the highest level of crisis stability. The investment -- already made -- in the development of the submarine and the missile, the construction of the bases at Bangor, Washington and Kings Bay, Georgia, and the inherent cost effectiveness of this strategic deterrent will serve the nation well into the next century.

NAVAL REACTORS FY 1991 BUDGET REQUEST

My FY 1991 budget request provides for the continued safe and reliable operation of naval nuclear activities and for an aggressive research and development program seeking to push the boundaries of pressurized water reactor technology, explore concepts for alternate propulsion systems, and maintain or improve the capabilities of existing reactors. This request for $652 million is less than my FY 1990 appropriation adjusted for inflation.

Efforts to design and develop new systems, components and propulsion plants are executed with funding identified in my budget under Reactor Development ($258.9M) and Plant Development ($89.3M). We can't just build better reactors to improve the performance of an entire propulsion plant -- we have to improve the plant components along with the reactor.

SSN 21 PROGRAM

The premier development effort is the Advanced Fleet Reactor (AFR) for the SEAWOLF (SSN-21) Class attack submarines. This reactor plant will provide significantly more power without commensurate weight and size penalties and will do so more quietly than any previous reactor plant developed. AFR work during the past year included:

- Completing analysis and testing to confirm core design.

- Completing manufacture of the prototype core.

- Delivering prototype closure head, core barrel, and most mechanisms to the core vendor for final assembly of the power unit.

- Installing the full-scale, non-fueled test core in a special test facility.

- Completing full-scale testing of the steam generator.

- Continuing development and beginning comprehensive reactor instrumentation and control equipment testing.

- Validating arrangements in the full-scale plant mockup.

In FY 1991, we will continue working aggressively on AFR development to ensure the Navy's schedules are met. Key activities will be assembling the prototype power unit, testing the reactor's electrical microprocessor equipment against the plant nuclear model, and performing acoustic and functional tests of the full scale non-fueled reactor assembly. Another important effort will be to ensure pertinent reactor manuals, drawings, and operating procedures are ready to ensure safe and reliable plant operation.

REACTOR TECHNOLOGY DEVELOPMENT

We will also work on post-AFR pressurized water reactor technology development. Key thrusts include: the new concept steam generator -- which will incorporate advanced materials and fluid flow technologies; the high performance fleet core -- which will have a significantly longer life; and the advanced performance experimental reactor -- the next-generation reactor beyond AFR. Performance gains in a maturing technology are exponentially harder to achieve. Advances require a broad-based development effort which includes work in:

- Materials development -- I need materials capable of maintaining their structural and mechanical integrity over long periods of time in a harsh reactor environment. In parallel, I want manufacturing processes that allow the materials to be economically produced to stringent specifications.

- Heat and fluid transfer equipment -- The best reactor in the world is useless in a ship without the equipment to convert its energy to propulsive power. For example, we are developing a new steam generator for AFR to complement and enhance the gains made in reactor development. I must ensure this equipment meets stringent space, weight, acoustic, stress, vibration and other requirements so it can survive a variety of demanding operating and combat situations.

- Chemistry - Reactor coolant and steam generator chemistry have a major impact on the performance and maintenance of reactor plant equipment. We are developing water chemistry methods and controls to significantly reduce the need for maintenance, personnel radiation exposure during maintenance, and the overall cost of maintenance.

- Physics analyses and computer modeling -- Complex core analyses allow us to assess material temperature, flow, and radiation conditions at selected spots in the core. These analyses are key to any future developments in reactor technology. We will improve and refine our modeling techniques to provide the most accurate representation of a reactor possible. Accurate modeling reduces the need for design margins and thereby increases allowable plant operating parameters.

- Electronics/power distribution -- Better instrumentation, control, and power distribution equipment allow plant operators to more accurately monitor and run a plant. AFR is being outfitted with advanced microprocessor and graphics based equipment. This development effort will have the same effect as better core analyses -- knowing our operating margins more precisely will allow us to get more usable power from the reactor.

Communication between the fleet and Program laboratories is extremely important -- I want the laboratory engineers to know what sailors think of the equipment on their ships. Based on this fleet and laboratory exchange, many technology gains made in developing new plants have been backfit into existing plants to improve capabilities. Corresponding input from the fleet has furthered our R&D work.

Advances in technology often mean a reduction in operating costs. We are starting the refueling of ENTERPRISE in early 1991 -- its first refueling since 1970. Between 1961 and 1970 ENTERPRISE was fueled three times. At her last refueling, advances in core technology allowed us to put in a new design core that has lasted almost five times longer. In a similar effort, we are currently refueling many of our attack submarines with longer-lived cores.

My FY 1991 budget request also includes efforts directed at ascertaining the feasibility of alternate cycles for naval application. Before committing to any technology, however, we must prove its worth for military application. The key question which must be answered is "will it make a better ship?" These alternatives are being reviewed at the program's laboratories by engineers who understand the give and take inherent in designing propulsion systems for ships. As with any complex technology, when you pursue one advantage in naval reactor design you usually create an off-setting disadvantage which must be weighed and accommodated.

PROTOTYPE PLANT OPERATION AND SERVICING

The Reactor Operation and Evaluation portion of my FY 1991 budget ($207.0M) provides for continuing the operation and servicing of the seven land-based prototype plants. These plants serve both R&D and training needs. As R&D platforms, the prototypes allow cores, components, and systems to be tested before they are placed in the ships. This allows any problems to surface and be resolved before they can affect fleet operations. Training on real reactors instills the necessary discipline and respect for nuclear technology and demonstrates the integration of the reactor plant with the engine room. In FY 1991, the refueling and overhaul of the S7G plant will continue as will preparations for the refueling and overhaul of the S8G plant and lesser servicing activities at several other plants. The advantages resulting from these prototype plants are a key to our technical success and unblemished safety record.

PROGRAM INFRASTRUCTURE

My FY 1991 budget requests for Capital Equipment ($55.4M), Construction ($27.4M), and Program Direction ($14.0M) ensure that the basic infrastructure and resources of the Program -- including both the physical plant and the personnel -- will remain efficient and effective.

The Capital Equipment funds will provide the laboratories with the equipment to maintain, upgrade, and ensure safe and reliable operation of the facilities. For example, in FY 1991 I plan to buy new loop instrumentation for the Advanced Test Reactor, replace or supplement a variety of prototype plant systems, and buy shipping cask equipment to ensure continued safe transport of irradiated material. The funds will also keep vital laboratory computing resources current with the rapidly evolving technology.

I have no new major construction starts in FY 1991 -- the $27.4M is to continue efforts to improve the Expended Core Facility and Advanced Test Reactor, and to renovate laboratory facilities.

Program Direction provides salaries, benefits, travel, and other expenses for my 215 full-time Federal employees in Washington, Pittsburgh, and Schenectady.

ADMIRAL BRUCE DeMARS
UNITED STATES NAVY

Admiral Bruce DeMars, of Chicago, Illinois, graduated from the United States Naval Academy in 1957. Following commissioning he served in the attack transports USS TELFAIR and USS OKANOGAN and, after Submarine School, the diesel-electric submarine USS CAPITAINE. Following nuclear power training he served in the nuclear-powered submarines USS GEORGE WASHINGTON, USS SNOOK and USS STURGEON before reporting for duty as Commanding Officer of USS CAVALLA.

Shore duty tours included instructor duty at Nuclear Power School and Submarine School and attendance at the Armed Forces Staff College. Following staff duty with Submarine Squadron TEN, he served as Senior Member of the Nuclear Propulsion Examining Board, U.S. Atlantic Fleet. He commanded Submarine Development Squadron TWELVE in New London, Connecticut and then served as Deputy Director, Attack Submarine Division in the Office of the Chief of Naval Operations until selected for promotion to Rear Admiral in 1981.

As a flag officer, he served as Commander, U.S. Naval Forces Marianas/Commander, U.S. Naval Base Guam and Commander of the Chief Pacific Representative for Guam and the Trust Territory of the Pacific Islands; as Assistant Deputy Chief and then Deputy Chief of Naval Operations for Submarine Warfare. He was appointed Director, Naval Nuclear Propulsion Program, Department of the Navy/Department of Energy in November 1988.

Admiral DeMars is married to the former Margaret Ann Milburn of Chicago, Illinois. They have two children, Bruce and Margaret.

REPORT NT-90-1
FEBRUARY 1990

ENVIRONMENTAL MONITORING AND DISPOSAL OF RADIOACTIVE WASTES FROM U.S. NAVAL NUCLEAR POWERED SHIPS AND THEIR SUPPORT FACILITIES

NAVAL NUCLEAR PROPULSION PROGRAM
DEPARTMENT OF THE NAVY
WASHINGTON, D.C. 20362

Report NT-90-1
February 1990

ENVIRONMENTAL MONITORING AND DISPOSAL OF RADIOACTIVE WASTES FROM U.S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES
1989

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ABSTRACT

The environmental effect of disposal of radioactive wastes originating from U. S. Naval nuclear propulsion plants and their support facilities is assessed. The total gamma radioactivity in liquids discharged to all ports and harbors from the more than one hundred fifty Naval nuclear-powered ships and supporting tenders, Naval bases and shipyards was less than 0.002 curie in 1989. This report confirms that procedures used by the Navy to control releases of radioactivity from U. S. Naval nuclear-powered ships and their support facilities are effective in protecting the environment and the health and safety of the general public. These procedures have ensured that no member of the general public has received measurable radiation exposure as a result of current operations of the Naval Nuclear Propulsion Program.

SUMMARY

The radioactivity in materials discussed in this report originates in the pressurized water reactors of U. S. Naval nuclear-powered ships. As of the end of 1989, the U. S. Navy had 132 nuclear-powered submarines and fifteen nuclear-powered surface ships in operation. Support facilities involved in construction, maintenance, overhaul and refueling of these nuclear propulsion plants include eight shipyards, eighteen tenders and four submarine bases. This report describes disposal of radioactive liquid, transportation and disposal of solid wastes, monitoring of the environment to determine the effect of radioactive releases, and updates reports on this subject issued by the Navy in references 1 through 5.* This report concludes that radioactivity associated with U. S. Naval nuclear-powered ships has had no significant or discernible effect on the quality of the environment. A summary of the radiological information supporting this conclusion follows:

From the start of the Naval Nuclear Propulsion Program, the policy of the U. S. Navy has been to reduce to the minimum practicable the amounts of radioactivity released into harbors. Navy procedures to accomplish this have been reviewed with the U. S. Department of Energy, the U. S. Nuclear Regulatory Commission and the U. S. Environmental Protection Agency. The total gamma radioactivity released within twelve miles from shore from all U. S. Naval nuclear-powered ships and their support facilities in recent years is shown in Table 1; this includes all harbors both U. S. and foreign entered by these ships.

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* References are listed on page 37.

TABLE 1 RADIOACTIVE LIQUID RELEASED TO HARBORS FROM U. S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES

Year	Number of Ships In Operation	Radioactivity-Curies (less tritium)
1971	100	less than 0.002
1972	104	less than 0.002
1973	107	less than 0.002
1974	111	less than 0.002
1975	113	less than 0.002
1976	115	less than 0.002
1977	120	less than 0.002
1978	124	less than 0.002
1979	126	less than 0.002
1980	126	less than 0.002
1981	133	less than 0.002
1982	137	less than 0.002
1983	142	less than 0.002
1984	144	less than 0.002
1985	147	less than 0.002
1986	149	less than 0.002
1987	148	less than 0.002
1988	148	less than 0.002
1989	147	less than 0.002

As a measure of the significance of these data, if one person were able to drink the entire amount of radioactivity discharged into any harbor in any of the last nineteen years, he would not exceed the annual radiation exposure permitted for an individual worker by the U. S. Nuclear Regulatory Commission.

Environmental monitoring is conducted by the U. S. Navy in U. S. and foreign harbors frequented by U. S. Naval nuclear-powered ships. This monitoring consists of analyzing harbor sediment, water and marine life samples for radioactivity associated with Naval nuclear propulsion plants, radiation monitoring around the perimeter of support facilities and effluent monitoring. Environmental samples from each of these harbors are also checked at least annually by a U. S. Department of Energy laboratory to ensure analytical procedures are correct and standardized.

Independent environmental monitoring has been conducted by the U. S. Environmental Protection Agency in U. S. harbors during the past several decades. The results of these extensive, detailed surveys have been consistent with Navy results. These surveys have again confirmed that U. S. Naval nuclear-powered ships and support facilities have had no significant effect on the radioactivity of the environment.

RADIOACTIVE LIQUID PROCESSING AND CONTROL

Policy and Procedures Minimizing Release of Radioactivity in Harbors

The policy of the U. S. Navy is to reduce to the minimum practicable the amounts of radioactivity released to the environment, particularly within twelve miles from shore including into harbors. This policy is consistent with applicable recommendations issued by the Federal Radiation Council (incorporated into the Environmental Protection Agency in 1970), U. S. Nuclear Regulatory Commission, National Council on Radiation Protection and Measurements, International Commission on Radiological Protection, International Atomic Energy Agency, and National Academy of Sciences--National Research Council (references 6 through 15). Keeping releases small minimizes the radioactivity available to build up in the environment or to concentrate in marine life. To implement this policy of minimizing releases, the Navy has issued standard instructions defining radioactive release limits and procedures to be used by U. S. Naval nuclear-powered ships and their support facilities. These instructions were reviewed by the U. S. Department of Energy, the U. S. Nuclear Regulatory Commission and the U. S. Environmental Protection Agency.

Source of Radioactivity

In the shipboard reactors, pressurized water circulating through the reactor core picks up the heat of nuclear reaction. The reactor cooling water circulates through a closed piping system to heat exchangers which transfer the heat to water in a secondary steam system isolated from the primary cooling water. The steam is then used as the source of power for the propulsion plant as well as for auxiliary machinery. Releases from the shipboard reactors occur primarily when reactor coolant water expands as a result of being heated to operating temperature; this coolant passes through a purification system ion exchange resin bed prior to being transferred from the ship.

The principal source of radioactivity in liquid effluents is trace amounts of corrosion and wear products from reactor plant metal surfaces in contact with reactor cooling water. Radionuclides with half-lives of approximately one day or greater in these corrosion and wear products include tungsten 187, chromium 51, hafnium 181, iron 59, iron 55, nickel 63, zirconium 95, tantalum 182, manganese 54, cobalt 58, and cobalt 60. The most predominant of these is cobalt 60, which has a 5.3 year half-life. Cobalt 60 also has the most restrictive concentration limit in water as listed by organizations which set radiological standards in references 6, 7 and 8 for these corrosion and wear radionuclides. Therefore, radioactivity is conservatively controlled by assuming that all the long-lived radioactivity is cobalt 60.

Radioactivity Removal From Liquid at Shore Facilities

Radioactive liquids at shore facilities are collected in stainless steel tanks and processed through a processing system to remove most of the radioactivity (exclusive of tritium) prior to collection in a clean tank for reuse. Even after processing to approximately 10^{-8} microcuries of gamma radioactivity per milliliter, reactor coolant is reused rather than discharged. Figure 1 shows a simplified block diagram of the liquid processing system which consists of particulate filters, activated carbon bed filters, mixed hydrogen hydroxyl resin and colloid removal resin beds. This type of processing system has been developed and used successfully to produce high quality water containing very low radioactivity levels.

Liquid Releases in Harbors

The total amounts of long-lived gamma radioactivity released into harbors and seas within twelve miles from shore have been less than 0.002 curie during each of the last nineteen years. This total is for releases from U. S. Naval nuclear-powered ships and from the supporting shipyards, tenders and submarine bases, and at operating bases and home ports in the U. S. and overseas and all other U. S. and foreign ports which were visited by Naval nuclear-powered ships. This quantity is conservatively reported as if it consisted entirely of cobalt 60, which is the predominant long-lived gamma radionuclide and also has the most stringent concentration limits.

To put this small quantity of radioactivity into perspective, it is less than the quantity of naturally occurring radioactivity (reference 16) in the volume of saline harbor water occupied by a single nuclear-powered submarine.

Although volumes are of less significance than the amounts of radioactivity released, Table 1 of earlier reports has also shown that the total volume of liquids released within twelve miles from shore has been reduced from millions of gallons per year in the 1960's to less than 25 thousand gallons per year beginning in 1973. Thus, the Navy has achieved its policy of reducing releases of radioactive liquids in harbors to the minimum practicable amounts. Therefore, volumes have been deleted from this report.

Short-Lived Radionuclides

Reactor coolant also contains short-lived radionuclides with half-lives of seconds to hours. Their highest concentrations in reactor coolant are from nitrogen 16 (7 second half-life), nitrogen 13 (10 minute half-life), fluorine 18 (1.8 hour half-life), argon 41 (1.8 hour half-life) and manganese 56 (2.6 hour half-life). Total short-lived radioactivity released in water in a year to any harbor has been less than 0.001 curie. For the longest-lived of these, about one day after discharge from an operating reactor, the concentration is reduced to one thousandth of the initial concentration, and in about two days the concentration is reduced to one millionth. Therefore, since most of the water is transferred to shore facilities for processing and reuse rather than discharged, these short-lived radionuclides are not important for liquid release considerations.

Fission Product Radionuclides

Fission products produced in the reactor are retained within the fuel elements. The fission gases krypton and xenon are also retained within the fuel elements. However, trace quantities of naturally occurring uranium impurities in reactor structural materials release small amounts of fission products to reactor coolant. The concentrations of fission products and the volumes of reactor coolant released are so low, however, that the total radioactivity attributed to long-lived fission product radionuclides, strontium 90 and cesium 137, in releases from U. S. Naval nuclear-powered ships and their support facilities has been less than 0.001 curie per year for all harbors combined. Fallout of these

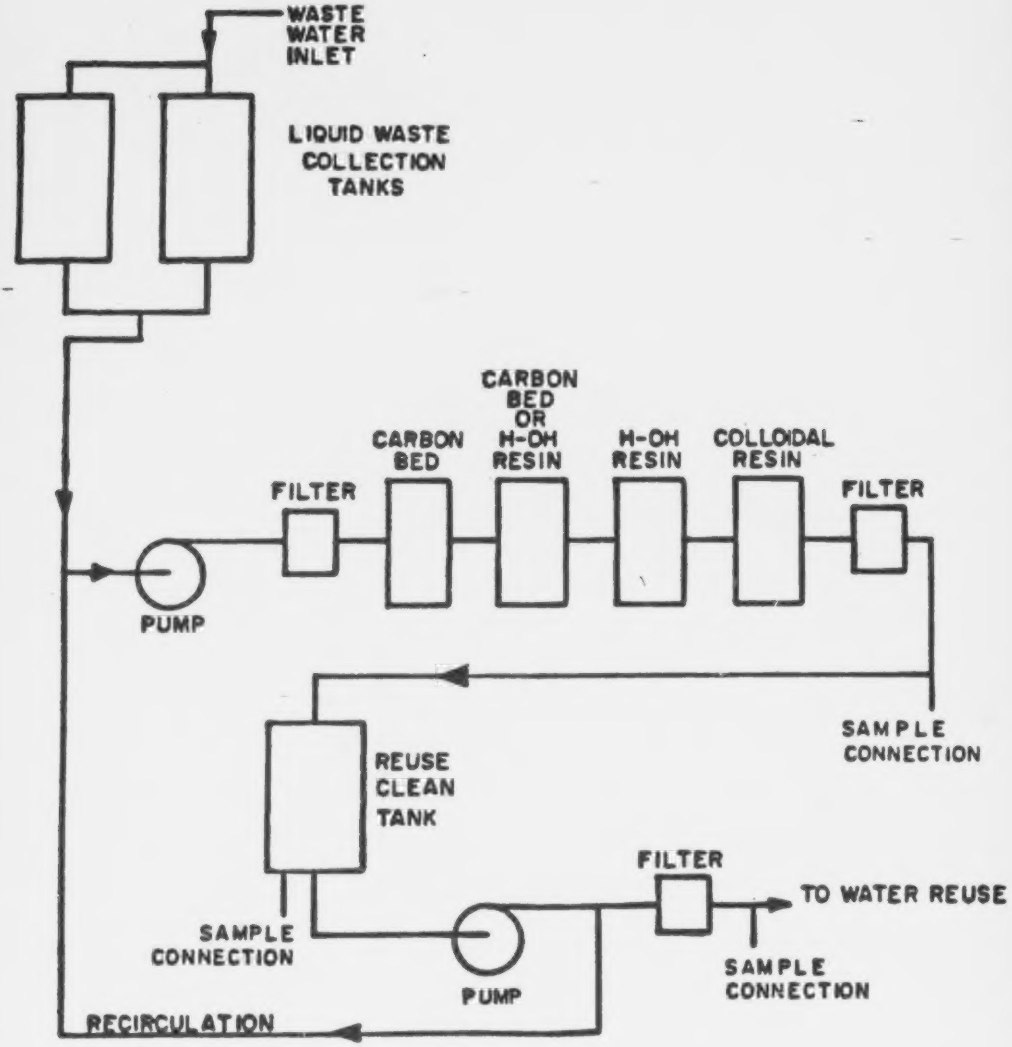

WASTE
WATER
INLET
LIQUID WASTE
COLLECTION
TANKS
CARBON
BED
OR
H-OH
RESIN
CARBON
BED
H-OH
RESIN
COLLOIDAL
RESIN
FILTER
FILTER
PUMP
SAMPLE
CONNECTION
REUSE
CLEAN
TANK
FILTER
TO WATER REUSE
SAMPLE
CONNECTION
PUMP
SAMPLE
CONNECTION
RECIRCULATION

FIGURE 1
SIMPLIFIED DIAGRAM OF WASTE PROCESSING
SYSTEM

same fission products has often been more than this in one rainfall in a single harbor.

Tritium

Small amounts of tritium are formed in reactor coolant systems as a result of neutron interaction with the approximately 0.015 percent of naturally occurring deuterium present in water, and other nuclear reactions. Although tritium has a 12 year half-life, the radiation produced is of such low energy that the radioactivity concentration guide issued by the International Commission on Radiological Protection, the National Council on Radiation Protection and Measurements, the U. S. Nuclear Regulatory Commission and by other standard-setting organizations is at least one hundred times higher for tritium than for cobalt 60. This tritium is in the oxide form and is chemically indistinguishable from water; therefore, it does not concentrate significantly in marine life or collect on sediment as do other radionuclides.

Tritium is naturally present in the environment because it is generated by cosmic radiation in the upper atmosphere. Reference 17 reports that the production rate from this source is about four million curies per year, which through rainfall causes a tritium inventory in the oceans of about seventy million curies. Because of this naturally occurring tritium, much larger releases of tritium than are conceivable from Naval nuclear reactors would be required to make a measurable change in the background tritium concentration.

The total amount of tritium released annually from all U. S. Naval nuclear-powered ships and their supporting tenders, bases and shipyards has been less than 200 curies. Most of this has been into the ocean greater than twelve miles from shore. The total tritium released from the entire nuclear Navy is less than single electrical generating nuclear power stations typically release each year (reference 18). Total tritium released into harbors within twelve miles from shore was less than one curie in 1989. Such releases are too small to increase measurably the tritium concentration in the environment. Therefore, tritium has not been combined with the data on other radionuclides in other sections of this report.

Carbon 14

Carbon 14 is also formed in small quantities in reactor coolant systems as a result of neutron interactions with nitrogen and oxygen. Carbon 14 decays with a half-life of 5,730 years; however, only low energy beta radiation is emitted as a result of this decay process. As a result, the radioactivity concentration guide for carbon 14 in its chemical form in air issued by the International Commission on Radiological Protection, the National Council on Radiation Protection and Measurements, the U. S. Nuclear Regulatory Commission and by other standard-setting organizations is at least three thousand times higher than for cobalt 60.

Carbon 14 occurs naturally in the environment. It is generated from cosmic radiation interactions with nitrogen and oxygen in the upper atmosphere and oxidized to form carbon dioxide. Carbon 14 is chemically indistinguishable from other isotopes of carbon. The carbon dioxide diffuses and convects throughout the atmosphere and enters the earth's carbon cycle. Reference 19 states that the earth's carbon 14 inventory is estimated to be about two hundred and fifty million curies. The total amount of carbon 14 released annually from the operation of all U. S. Naval nuclear-powered ships and their supporting tenders, bases and shipyards has been less than 100 curies, most of which is released at sea beyond twelve miles from shore. The total carbon 14 radioactivity released in a year in any harbor has been less than 0.1 curie. Since the inventory of naturally occurring carbon 14 is so large, it is extremely unlikely that releases from Naval nuclear reactors could result in a measureable change in the background concentration of carbon 14. Therefore, carbon 14 has not been combined with the data on other radionuclides in other sections of this report.

Liquid Releases at Sea

Radioactive liquids incidental to the operation of the nuclear propulsion plants are released at sea under strict controls. These ocean releases are consistent with recommendations the Council on Environmental Quality made in 1970 to the President in reference 20, and consistent with the Marine Protection, Research and Sanctuaries Act, reference 21. Procedures and limits for ocean releases have been consistent with recommendations made by the National Academy of Sciences--National Research Council in reference

10 and by the International Atomic Energy Agency in reference 11. These releases have contained much less radioactivity than these reports considered would be acceptable. Total long-lived radioactivity released farther than twelve miles from shore by U. S. Naval nuclear-powered ships and supporting tenders is shown in Table 2 for recent years. This is the total amount released from over 100 ships at different times of the year in the open sea at long distances from land in small incremental amounts, and under rapid dispersal conditions due to wave action. The quantity of radioactivity released to the open ocean in 1989 was 0.4 curie, which is less than the naturally occurring radioactivity (reference 16) in a cube of sea water approximately 100 yards on a side.

TABLE 2 TOTAL RADIOACTIVITY IN LIQUID RELEASED AT SEA ORIGINATING FROM U. S. NAVAL NUCLEAR-POWERED SHIPS

	Radioactivity-Curies (less tritium)
1975	0.4
1976	0.4
1977	0.4
1978	0.4
1979	0.4
1980	0.4
1981	0.4
1982	0.4
1983	0.4
1984	0.4
1985	0.4
1986	0.4
1987	0.4
1988	0.4
1989	0.4

Loss of USS THRESHER and USS SCORPION

Two U. S. Naval nuclear-powered submarines have been lost at sea in the Atlantic Ocean. The submarine THRESHER sank 10 April 1963, 100 miles from land in water 8,500 feet deep at latitude 41°45'N and longitude 65°00'W. The submarine SCORPION sank between 21 and 27 May 1968, 400 miles southwest of the Azores in more than 10,000 feet of water. The reactors used in all U. S. Naval submarines and surface ships are designed to minimize potential hazards to the environment even under the most severe casualty conditions such as the actual sinking of the ship. First, the reactor core is so designed that it is physically impossible for it to explode like a bomb. Second, the reactor fuel elements are made of materials that are extremely corrosion resistant, even in sea water. The reactor core could remain submerged in sea water for decades without releases of fission products while the radioactivity decays, since the protective cladding on the fuel elements corrodes only a few millionths of an inch per year. Thus, in the event of a serious accident where the reactor is completely submerged in sea water, the fuel elements will remain intact for an indefinite period of time, and the radioactive material contained in these fuel elements should not be released. The maximum rate of release and dispersal of the radioactivity in the ocean, even if the protective cladding on the fuel were destroyed, would be so low as to be insignificant.

Radioactive material could be released from this type of reactor only if the fuel elements were actually to melt and, in addition, the high-strength, all-welded reactor system boundary were to rupture. The reactor's many protective devices and inherent self-regulating features are designed to prevent any melting of the fuel elements. Flooding of a reactor with sea water furnishes additional cooling for the fuel elements and so provides added protection against the release of radioactive fission products.

Radiation measurements, water samples, bottom sediment samples and debris collected from the area where THRESHER sank were analyzed for radioactivity shortly after the sinking and again in 1965 by various laboratories. Similarly, sea water and bottom sediment samples taken near SCORPION's hull were analyzed for radioactivity. In 1977, 1983 and 1986, followup samples of water, sediment, marine life and debris were collected from the immediate THRESHER debris areas. In 1979 and 1986, followup samples of water, sediment, marine life and debris were collected from the immediate SCORPION debris areas. None of these samples showed any evidence of release of radioactivity from the reactor fuel elements in either THRESHER or SCORPION. However, cobalt 60 released from both THRESHER and SCORPION coolant systems was detectable at low levels in the sediment samples in the debris areas. The amount of cobalt 60 radioactivity in these samples was small compared to the naturally occurring radioactivity in the sediments. Based on the samples, less than 0.001 curie of cobalt 60 was estimated to be present in the sediment at either site.

Cobalt 60 was not detectable in samples of water, marine life or debris. Thus, the THRESHER and SCORPION have not had a significant effect on the radioactivity in the environment. Additional information on the radiological surveys of the THRESHER and SCORPION debris areas is available in reference 22.

SOLID RADIOACTIVE WASTE DISPOSAL

During maintenance and overhaul operations, solid low-level radioactive wastes consisting of contaminated rags, plastic bags, paper, filters, ion exchange resin and scrap materials are collected from nuclear-powered ships and their support facilities. These low-level radioactive materials are required to be strictly controlled to prevent loss. These controls include Naval accountability procedures which require serialized tagging and marking and signatures by radiologically trained personnel.

Solid radioactive waste materials are packaged in strong tight containers, shielded as necessary and shipped to burial sites licensed by the U. S. Nuclear Regulatory Commission or a State under agreement with the U. S. Nuclear Regulatory Commission. Solid radioactive materials from Naval nuclear-powered ships have not been dumped at sea since 1970 when the Navy issued procedures prohibiting sea disposal of solid radioactive materials. Shipyards and other shore facilities are not permitted to dispose of radioactive solid wastes by burial on their own sites.

Table 3 summarizes the total radioactivity and volumes of radioactive solid waste disposed of during the last five years. Table 3 includes all waste generated by U. S. Naval nuclear-powered ships and the listed support facilities since all radioactive solid waste generated by U. S. nuclear-powered ships is transferred to the listed facilities. The quantity of solid radioactive waste in any one year from a particular facility depends on the amount and type of support work performed that year. Table 3 does not include fuel or other classified radioactive components shipped to Department of Energy facilities for processing and for disposal.

TABLE 3 RADIOACTIVE SOLID WASTE FROM U. S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES FOR 1985 THROUGH 1989

Facility	1985 Thousand Cubic Feet	1985 Curies	1986 Thousand Cubic Feet	1986 Curies	1987 Thousand Cubic Feet	1987 Curies	1988 Thousand Cubic Feet	1988 Curies	1989 Thousand Cubic Feet	1989 Curies
Kittery, Maine Portsmouth Naval Shipyard	1	1	1	1	1	<1	1	2	9	3
Groton, New London, Conn., Electric Boat Division, State Pier and Sub Base	1	<1	1	<1	2	<1	2	<1	1	1
Newport News, Virginia Newport News Shipbuilding	3	<1	4	<1	3	3	7	<1	15	<1
Norfolk, Virginia Naval Shipyard and Tenders	11	38	9	55	6	1	11	1	5	<1
Charleston, South Carolina Naval Shipyard and Tenders	7	7	6	18	7	4	8	51	10	11
San Diego, California Tenders	1	2	--	--	--	--	--	--	--	--
Vallejo, California Mare Island Naval Shipyard	7	17	2	6	10	2	6	4	5	3
Bremerton, Washington Puget Sound Naval Shipyard	6	11	9	53	6	1	8	62	7	1
Pearl Harbor, Hawaii Naval Shipyard & Sub Base	12	61	2	3	3	7	4	5	6	1
TOTAL	49	139	34	138	38	20	47	127	58	22

NOTES:

(1) This table includes all radioactive waste from tenders and nuclear-powered ships. This radioactivity is primarily cobalt 60. This radioactive waste is shipped to burial facilities licensed by the U. S. Nuclear Regulatory Commission or a State.

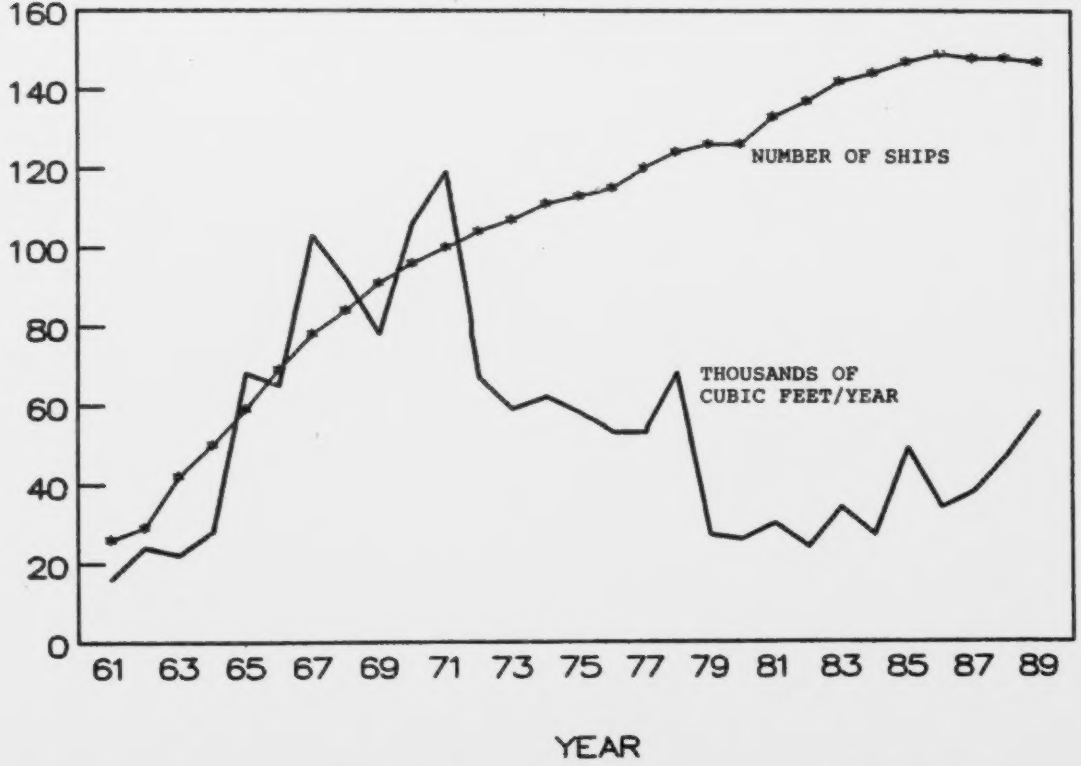
(2) Volumes less than 500 cubic feet are reported as 1 thousand cubic feet and activities less than 0.5 curie are reported as <1 curie.

Figure 2 shows that in the last several years the total annual volume of solid low-level radioactive waste has been substantially reduced, despite increasing numbers of ships. Most of the volume is generated during maintenance and overhaul operations in shipyards. This reduction has been accomplished simultaneously with reduction in personnel radiation exposure, as described in reference 23. This reduction has been accomplished by several techniques including a total containment concept for radiological work which minimizes the spread of radioactivity to non-radioactive materials, use of preplanning and mockups to minimize rework, reusing rather than disposing of tools and equipment, use of radioactive liquid processing procedures which minimize depletion of processing media, use of compaction equipment and efficient packaging to fully use space in disposal containers, and separating solid waste that requires special disposal owing to its radioactive content from that which does not. The latter is achieved by work site controls and by use of sensitive detection equipment to detect radioactivity only slightly greater in concentration than that found in natural materials such as soil, rocks, water, and biological matter (see reference 22) thus requiring the material to be handled as radioactive for waste disposal purposes. Material which passes the screening provided by this sensitive detection equipment can be disposed of as ordinary waste. Challenging goals are set by each shipyard to ensure continuing management attention to minimizing generation of waste in radiological work.

The annual volume for the entire Naval Nuclear Propulsion Program could be contained in a cube measuring about thirteen yards on a side. The total annual volume of solid radioactive waste from the Naval Nuclear Propulsion Program listed in Table 3 is less than some individual electrical generating nuclear power stations have generated in a year (reference 18). The total annual volume is approximately six percent of the solid radioactive waste generated annually by all nuclear electric power reactors (reference 18) and approximately four percent of the total volume of radioactive solid waste buried in all U. S. commercial burial grounds each year (reference 24).

FIGURE 2

RADIOACTIVE SOLID WASTE DISPOSAL VOLUMES IN THE NAVAL NUCLEAR PROPULSION PROGRAM, 1961-1989



Deactivation of Ingalls Shipbuilding Radiological Facilities

From 1958 to 1980, Ingalls Shipbuilding was engaged in the construction and overhaul of Naval nuclear-powered ships in Pascagoula, Mississippi. The shipyard radiological facilities which supported this work were deactivated between 1980 and 1982 by removing and disposing of all radioactive material associated with Naval nuclear propulsion plants. Useful items, such as tools and equipment that were radioactively contaminated, were transferred to other organizations in the Naval Nuclear Propulsion Program. The remaining radioactive material was disposed of as solid waste.

Extensive radiological decommissioning surveys were performed to verify the removal of this radioactive material. Direct radiological surveys were performed on over 274,000 square feet of building and facility surfaces. Over 11,000 samples of these surfaces as well as soil, ground cover and concrete were taken from all areas where radioactive work was previously performed. These samples were analyzed using sensitive laboratory equipment. In addition, both the State of Mississippi and the Environmental Protection Agency (reference 25) performed overcheck surveys of the deactivated facilities. After these surveys were completed, the Ingalls facilities were released for unrestricted use. Personnel who subsequently occupy these facilities will not receive measurable radiation exposure above natural background levels that exist in areas not affected by Naval nuclear propulsion plant work. Reference 25 is the report of the survey of the Ingalls facilities by the Environmental Protection Agency.

TRANSPORTATION OF RADIOACTIVE MATERIAL

Shipments of radioactive materials in the Naval Nuclear Propulsion Program are required to be made in accordance with applicable regulations of the U. S. Department of Transportation, U. S. Department of Energy, and U. S. Nuclear Regulatory Commission. The purpose of these regulations is to ensure that shipments of radioactive material are adequately controlled to protect the environment and the health and safety of the general public. These regulations are applicable to all radioactive material shipments. The shipments discussed herein cover areas in addition to waste for completeness.

The above regulations provide requirements for the container design, certification, and identification as applicable for the specific quantity, type and form of radioactivity being shipped. Naval shipping container design requirements invoke shielding and integrity specifications and meet all regulatory requirements. They provide for testing of container designs, training and qualification of workers who construct containers, and quality control inspections during fabrication to ensure the containers will meet their design requirements.

In addition to imposing requirements of Federal transportation regulations, the Navy has issued standard instructions to further control shipments of radioactivity associated with U. S. Naval nuclear propulsion plants. These standard instructions result in a quality assurance program which includes inspections and assessments by independent organizations and senior management. Organizations making shipments are required to prepare local procedures which require use of compliance checklists and management review to ensure compliance with applicable Department of Transportation, Navy and burial ground requirements. Only specially trained, designated people, knowledgeable in shipping regulations, are permitted to authorize shipments of radioactive material.

Protective transportation service such as signature security service or sealed shipping vehicles are required for these shipments to ensure point-to-point control and traceability of each shipment from shipper to receiver. A readily accessible log of all shipments in transit is maintained to enable prompt identification and provide the basis for advice on the nature of the shipment. Return receipts are required to be made in writing by receivers to ensure that radioactive material has not been lost in shipment. Receipt inspection of containers of radioactive material and accompanying documents are required promptly after receipt to monitor compliance. Even minor discrepancies from detailed shipping regulations are required to be reported to the shipper so that correction can be made in future shipments. This is done to ensure compliance with shipping regulations.

Radioactive materials shipped in the Naval Nuclear Propulsion Program include anticontamination clothing for laundry, small sealed sources used for calibrating radiation monitoring instruments, tools and equipment used for radioactive work, low-level radioactive waste, radioactive components and new and recoverable irradiated nuclear fuel. A total of approximately 1,000 shipments are made annually by Naval nuclear-powered ships and their support facilities, which is a small part of the more than two million shipments of radioactive materials made annually in the United States (Reference 26).

Nearly all radioactive shipments in the Naval Nuclear Propulsion Program contain only low-level radioactivity classified under Department of Transportation regulations as low specific activity or limited quantity shipments. The predominant radionuclide associated with these shipments is cobalt 60 in the form of insoluble metallic oxide corrosion products attached to surfaces of materials inside shipping containers. Most low-level shipments are made by truck. Air transport is used no more than a few times per year for the Naval Nuclear Propulsion Program. These air shipments involve only very low-level radioactivity and are not shipped on passenger planes.

Approximately one quarter of the low-level radioactivity shipments are minute quantities in sealed instrument calibration check sources. These sources contain insignificant quantities of radioactivity which are comparable to the radioactivity in typical ionization type smoke detectors. Greater than one-half of these low-level shipments are anticontamination clothing, equipment and tools. The anticontamination laundry involves shipments of special outer clothing potentially contaminated with low levels of radioactivity while worn in controlled work areas. This laundry is shipped by Nuclear Regulatory Commission licensed contractors to their facilities for cleaning. On the average, one shipment of low-level radioactive waste per three months is made from each facility listed in Table 3.

The remaining few shipments are new and recoverable irradiated nuclear fuel and radioactive components associated with reactors and these are shipped by the U. S. Department of Energy. Such shipments are made infrequently since U. S. Naval nuclear-powered ships need refueling infrequently. Recoverable irradiated fuel shipments are made to Department of Energy facilities for disposition. Measures are carried out to assist in safeguarding these shipments and assuring they reach their destination. Each recoverable irradiated fuel shipment is escorted by U. S. Government representatives and each shipping container is specifically designed to withstand extreme accident impacts, fire, or water immersion, and to prevent release of the material to the environment in the event of an accident. The cargo in the nuclear fuel and radioactive component shipments is non-explosive and non-flammable and, in addition, the radioactive material in the radioactive components is in an insoluble form that should not be dispersed even in the event of an accident.

Estimates of radiation exposure to transportation crews and the general public from shipments of radioactive materials in the Naval Nuclear Propulsion Program have been made in a manner consistent with that employed by the U. S. Nuclear Regulatory Commission in reference 26. Based on comparisons of the types and numbers of radioactive shipments made, the total annual radiation exposure to all transportation crews for all shipments is estimated to be less than three man-rem. If one person were to receive all this exposure, he would not exceed the radiation exposure permitted for an individual worker by the U. S. Nuclear Regulatory Commission. The total estimated radiation exposure accumulated by the public along transportation routes is not more than a few times higher than the exposure to transportation workers. The maximum exposure to any individual member of the public would be far less than that received from natural radiation.

Shipments of radioactive materials associated with Naval nuclear propulsion plants have not resulted in any measurable release of radioactivity to the environment. There have never been any significant accidents involving release of radioactive material during shipment since the Naval Nuclear Propulsion Program began. In general, the few accidents that have occurred involved incidents such as broken truck axles or slight external damage to a shipping container with no release of radioactivity. In one incident a train collision resulted in minor denting of a new fuel shipping container with no loss of integrity of the container, no damage to the fuel and no release of radioactivity. In the only two instances that involved loss of contents, one quart containers holding samples were broken in shipment. In one case this occurred when a cargo aircraft crashed. The other container was lost from a commercial ship. Both containers were recovered and there was no measurable radioactivity released since the original contents were less than one millionth of a curie.

The requirements of the Naval Nuclear Propulsion Program specify that the carriers for all radioactive material shipments shall have accident plans which identify the actions to be taken in the event the transportation vehicle is involved in an accident. These plans provide for notification of civil authorities and the originating facility. The U. S. Navy would communicate with and cooperate fully with State radiological officials in the event of occurrences involving shipment of radioactive materials.

ENVIRONMENTAL MONITORING

To provide additional assurance that procedures used by the U. S. Navy to control radioactivity are adequate to protect the environment, the Navy conducts environmental monitoring in harbors frequented by its nuclear-powered ships. Environmental monitoring surveys for radioactivity are periodically performed in harbors where U. S. Naval nuclear-powered ships are built or overhauled and where these ships have home ports or operating bases. Samples from each harbor monitored are also checked at least annually by a U. S. Department of Energy laboratory to ensure analytical procedures are correct and standardized. The Department of Energy laboratory results have been consistent with shipyard results.

Navy Environmental Monitoring Program

The current Navy environmental monitoring program consists of analyzing samples of harbor sediment, water and marine life, supplemented by shoreline surveys, posted dosimeters and effluent monitoring. Sampling harbor sediment and water each quarter year is emphasized since these materials would be the most likely affected by releases of radioactivity.

As discussed earlier, cobalt 60 is the predominant radionuclide of environmental interest resulting from Naval nuclear reactor operations. Therefore, Navy monitoring procedures require collecting in each harbor approximately 20 to 120 sediment samples once each quarter year for analysis to detect cobalt 60 and other gamma emmitting radionuclides. Locations and numbers of sediment samples for a particular harbor depend on the size of the harbor and the number and separation of locations where nuclear-powered ships berth. Sampling points are selected to form a pattern around ship berthing locations and to provide points in areas away from these berthing locations. The sampling locations are selected individually for each harbor considering characteristics of the harbor. Sediment samples are collected using the dredge shown in Figure 3.

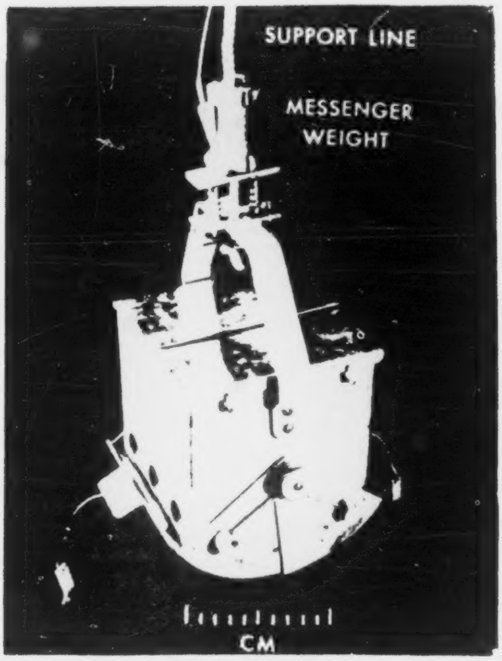

SUPPORT LINE
MESSENGER WEIGHT
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FIGURE 3
DREDGE FOR SAMPLING HARBOR SEDIMENT

The dredge samples a surface area of 36 square inches and has been modified to collect only the top one-half to one inch of sediment. The top layer was selected because it should be more mobile and more accessible to marine life than deeper layers. The samples are drained of excess water and placed directly into a Marinelli container for analysis. Each sediment sample is analyzed for gamma radioactivity in the container in which it is collected using a solid state germanium detector with a multichannel analyzer. The gamma data is analyzed specifically for the presence of cobalt 60. Results of the sediment samples from harbors monitored by the Navy in the U. S. and possessions for 1989 are summarized in Table 4.

Table 4 shows that most harbors do not have detectable levels of cobalt 60. As reported in the past, low levels of cobalt 60, less than three millionths of a microcurie per gram, are detected around a few operating base and shipyard piers where nuclear-powered ship maintenance and overhauls were conducted in the early 1960's. These low levels are well below the naturally occurring radioactivity levels in the harbors. The radioactivity detected is from operations in the early 1960's since releases such as shown earlier in Table 1 are too small to be detectable in the harbors. Historically, low levels of cobalt 60 were also detectable as a result of world wide dispersion from atmospheric weapons testing. A measure of the significance of this range is that if all a person's food were to contain three millionths of a microcurie of cobalt 60 per gram, he would not exceed ten percent of the radiation exposure levels permitted in references 6, 7 and 8 for members of the general public. Cobalt 60 is not detectable in general harbor bottom areas away from these piers.

Low levels of cesium 137 were detected in some sediment samples. The cesium 137 detected is not related to Naval nuclear reactor operations because the high integrity of the Naval fuel retains fission products. The cesium 137 concentrations measured in the sediment are due to world wide dispersion from weapons testing and Chernobyl fallout.

For comparison, references 27 and 28 contain evaluations by laboratories of the Environmental Protection Agency and of the Department of Energy of the effects on the environment from the accumulation near points of discharge of radionuclides from several nuclear facilities. The referenced reports conclude that radioactivity levels much greater than shown in Table 4 for Naval Nuclear Propulsion

TABLE 4 SUMMARY OF 1989 SURVEYS FOR COBALT 60 IN BOTTOM SEDIMENT OF U. S. HARBORS WHERE U. S. NAVAL NUCLEAR-POWERED SHIPS HAVE BEEN REGULARLY BASED, OVERHAULED OR BUILT

	Range of Cobalt 60 Analytical Results (10^{-6}uCi/gm)	Number of Samples With Cobalt 60		Total Bottom Area With Cobalt 60 Over $3\text{x}10^{-6}$ uCi/gm (Square Kilometers)
		Less Than $3\text{x}10^{-6}$uCi/gm	Greater Than $3\text{x}10^{-6}$uCi/gm	
Kittery, Maine Portsmouth Naval Shipyard	<0.02 - <0.18	120	0	0
Groton, New London, Conn. Electric Boat Division, State Pier and Sub Base	<0.04 - 1.63	528	0	0
Newport News, Virginia Newport News Shipbuilding	<0.02 - <0.17	152	0	0
Norfolk, Virginia Naval Shipyard and Base	<0.03 - <0.18	280	0	0
Charleston, South Carolina Naval Shipyard and Bases	<0.01 - <0.13	280	0	0
Kings Bay, Georgia	<0.01 - <0.09	98	0	0
San Diego, California Navy Piers	<0.02 - <0.17	252	0	0
Vallejo, California Mare Island Naval Shipyard	<0.03 - <0.25	228	0	0
Bremerton, Washington Naval Shipyard and Base	<0.02 - <0.14	332	0	0
Pearl Harbor, Hawaii Naval Shipyard and Sub Base	<0.02 - 0.23	192	0	0
Apra Harbor, Guam	<0.01 - <0.09	133	0	0
Port Canaveral, Florida	<0.01 - <0.10	80	0	0

NOTES:

(1) The "<" symbol indicates no cobalt 60 was detected in the sample. The number given is the minimum detectable activity (MDA) i.e., the concentration at which cobalt 60 could be detected if it were present. The MDA varies from sample to sample and location to location due to statistical fluctuations.

(2) uCi/gm = microcurie per gram. 1 uCi = $1\text{x}10^{-6}$ curie (Ci).

(3) One square kilometer is approximately 0.4 square mile. Estimated total cobalt 60 in the top layer of sediment is 0.01 Ci. Samples more than one foot deep from several harbors show that total cobalt 60 present may be two to five times that measured in the surface layer.

Program facilities have caused no significant radiation exposure to the general public.

The maximum total radioactivity observed in a U. S. harbor is less than 0.05 curie of cobalt 60. This radioactivity is small compared to background. Based on the typical concentrations of naturally occurring radioactivity such as potassium 40, radium, uranium and thorium which are described in reference 16 for marine sediment, the natural radioactivity in the sediment of a typical harbor amounts to hundreds of curies.

In addition to Navy analysis of environmental samples, at least ten sediment samples from each harbor monitored have been sent each year to a U. S. Department of Energy laboratory, as a check of Navy results. This Department of Energy laboratory provides a further check on the quality of environmental sample analyses by participating in the quality control programs sponsored by the Department of Energy and the Environmental Protection Agency.

The check samples were analyzed for gamma radionuclides in a manner similar to Navy procedures but with greater sensitivity. Figure 4 depicts the gamma spectra for two such samples. Both spectra show the presence of abundant naturally occurring radionuclides which contribute to measured radioactivity even if cobalt 60 were not present. The upper spectrum is for a sample to which cobalt 60 has been added to achieve a concentration of approximately three millionths of a microcurie per gram and shows easily recognizable energy peaks due to the presence of this small concentration of cobalt 60. The lower spectrum depicts the appearance of most of the sediment samples collected.

At least five water samples are taken in each harbor once each quarter year in areas where nuclear-powered ships berth and from upstream and downstream locations. These samples are analyzed for gamma radioactivity, including cobalt 60. A solid state germanium detector with a multichannel analyzer is used to measure gamma radioactivity and detect the presence of cobalt 60. Procedures for analysis will detect cobalt 60 if its concentration exceeds the U. S. Environmental Protection Agency drinking water limits of reference 14. No cobalt 60 has been detected in any of the water samples from all harbors monitored.

An Environmental Protection Agency evaluation in reference 29 shows that the cobalt 60 from Naval nuclear propulsion plants is in the form of metalic corrosion product particles which do not appear to be concentrated in

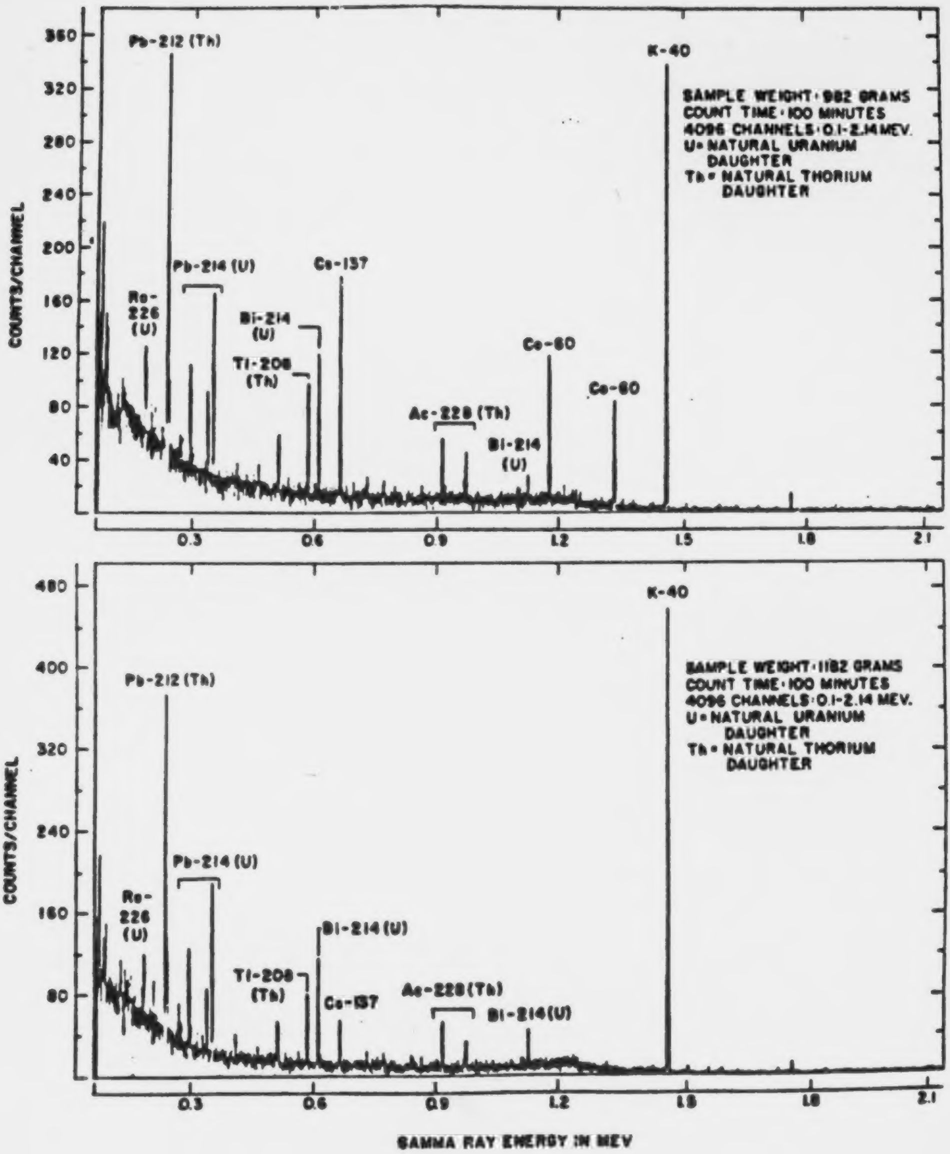

FIGURE 4

GAMMA SPECTRA OF HARBOR BOTTOM SEDIMENT
SAMPLES WITH A GERMANIUM DETECTOR

the food chain. However, samples of marine life such as mollusks, crustaceans and marine plants have been collected in 1989 from all harbors monitored. Marine life samples are also analyzed using a germanium detector with a multichannel analyzer. The results of the marine life samples from harbors monitored by the Navy in the U. S. and possessions for 1989 are summarized in Table 5. Table 5 demonstrates that no buildup of cobalt 60 associated with U. S. Naval nuclear-powered ships has been detected in these samples of marine life.

In all monitored harbors, twice per year shoreline areas uncovered at low tide are surveyed for radiation levels with sensitive scintillation detectors to determine if any radioactivity from bottom sediment washed ashore. All results were the same as background radiation levels in these regions, approximately 0.01 millirem per hour. Thus, there is no evidence in these ports that these areas are being affected by nuclear-powered ship operations.

Ambient radiation levels are measured using sensitive thermoluminescent dosimeters continuously posted at locations outside the boundaries of areas where radiological work is performed. These dosimeters are also posted at locations remote from support facilities to measure background radiation levels from natural radioactivity. The results of dosimeters posted at support facilities between radiologically controlled areas and the general public and dosimeters posted at remote background locations up to several miles away are compared in Table 6. The range of dosimeter readings is also given since natural background radiation levels vary from location to location primarily due to the concentration of radionuclides in the soil (reference 30). The results of Table 6 show that Naval Nuclear Propulsion Program activities in 1989 had no distinguishable effect on normal background radiation levels at the site perimeter.

Naval nuclear reactors and their support facilities are designed to ensure there are no significant discharges of radioactivity in airborne exhausts. Radiological controls are exercised in support facilities to preclude exposure of working personnel to airborne radioactivity exceeding limits for the general population specified in reference 6. These controls include a total containment concept for radioactive materials and provide a barrier to prevent significant radioactivity from becoming airborne. Further, all air exhausted from these facilities is passed through high efficiency particulate air filters and monitored during discharge. Comparison of sensitive airborne radioactivity

TABLE 5 SUMMARY OF 1989 SURVEYS FOR COBALT 60 IN MARINE LIFE OF U. S. HARBORS WHERE U. S. NAVAL NUCLEAR-POWERED SHIPS HAVE BEEN REGULARLY BASED, OVERHAULED OR BUILT

	Mollusks Cobalt 60 Analytical Results (10^{-6} uCi/gm)	Crustaceans Cobalt 60 Analytical Results (10^{-6} uCi/gm)	Marine Plants Cobalt 60 Analytical Results (10^{-6} uCi/gm)
Kittery, Maine **Portsmouth Naval Shipyard**	<0.06	<0.06	<0.23
Groton, New London, Conn. **Electric Boat Division, State Pier and Sub Base**	<0.05	<0.05	<0.06
Newport News, Virginia **Newport News Shipbuilding**	<0.02	<0.05	<0.06
Norfolk, Virginia **Naval Shipyard and Base**	<0.05	<0.05	<0.04
Charleston, South Carolina **Naval Shipyard and Bases**	<0.03	<0.05	N/A
Kings Bay, Georgia	<0.03	<0.02	<0.02
San Diego, California **Navy Piers**	<0.03	<0.03	<0.04
Vallejo, California **Mare Island Naval Shipyard**	<0.06	<0.06	<0.05
Bremerton, Washington **Naval Shipyard and Base**	<0.05	<0.06	<0.06
Pearl Harbor, Hawaii **Naval Shipyard and Sub Base**	N/A	<0.16	<0.05
Apra Harbor, Guam	<0.03	<0.03	N/A
Port Canaveral, Florida	<0.03	<0.02	<0.02

NOTES:

(1) The "<" symbol indicates no cobalt 60 was detected in the sample. The number given is the minimum detectable activity (MDA) i.e., the concentration at which cobalt 60 could be detected if it were present. The MDA differs from sample to sample and location to location due to statistical fluctuations.

(2) uCi/gm = microcurie per gram. 1 uCi = 1×10^{-6} curie (Ci).

(3) N/A = Not Available. Samples of marine life from this location were not availabe for collection.

TABLE 6 SUMMARY OF 1989 OFF-SITE AND PERIMETER RADIATION MONITORING OF U. S. HARBORS WHERE U. S. NAVAL NUCLEAR-POWERED SHIPS HAVE BEEN REGULARLY BASED, OVERHAULED OR BUILT

	Average Off-site Dosimeter (mrem/qtr)	Range of Off-site Dosimeter (mrem/qtr)	Average Perimeter Dosimeter (mrem/qtr)	Range of Perimeter Dosimeter (mrem/qtr)
Kittery, Maine Portsmouth Naval Shipyard	20	17 - 23	20	14 - 33
Groton, New London, Conn. Electric Boat Division, State Pier and Sub Base	26	14 - 38	23	14 - 44
Newport News, Virginia Newport News Shipbuilding	13	10 - 18	12	9 - 17
Norfolk, Virginia Naval Shipyard and Base	26	20 - 30	17	11 - 31
Charleston, South Carolina Naval Shipyard and Bases	23	17 - 29	22	11 - 31
Kings Bay, Georgia	21	18 - 27	21	15 - 30
San Diego, California Navy Piers	22	15 - 36	19	12 - 39
Vallejo, California Mare Island Naval Shipyard	19	12 - 22	18	11 - 27
Bremerton, Washington Naval Shipyard and Base	15	11 - 17	15	12 - 19
Pearl Harbor, Hawaii Naval Shipyard and Sub Base	15	12 - 20	15	11 - 25
Apra Harbor, Guam	17	13 - 20	16	8 - 20
Port Canaveral, Florida	17	13 - 22	18	14 - 21

NOTE:
(1) mrem/qtr = millirem per quarter year. 1 mrem = $1\text{x}10^{-3}$ rem.

measurements in shipyards demonstrates that air exhausted from facilities actually contained a smaller amount of radioactivity than this same air contained when it was drawn from the environment into the facilities. There were no discharges of airborne radioactivity from these facilities above concentrations normally present in the atmosphere.

ENVIRONMENTAL PATHWAYS ANALYSIS

Results of monitoring of environmental samples described above have shown that environmental radioactivity levels have not been changed appreciably and therefore radiation exposure to the public from operations of nuclear-powered ships and their support facilities is too low to measure. Nevertheless, a detailed analysis has been performed to provide a quantitative estimate of the radiation exposure to which any member of the general public might be exposed as a result of radioactivity in liquid and airborne effluents.

This analysis has been performed in a conservative manner which ensures that the estimated exposure is higher than any actual exposure would be. For example, the sites chosen for analysis were shipyards since the amount of radiological work at these facilities is considerably higher than at other types of support facilities. Quantities of radioactivity from shipyard releases used in this analysis are higher than have been measured from any shipyard in the last eight years. Values of environmental parameters, including meteorological conditions and radionuclide concentration factors, have been chosen to provide conservative results. In addition, the analysis assumes the individual receiving the maximum exposure is located right at the site boundary. Thus, the actual exposures to members of the public are expected to be lower than the results of this analysis.

The environmental pathways which were considered are depicted in Figure 5, which is based on reference 8. The hypothetical releases assumed are listed in Table 7. Table 8 shows the assumed usage parameters which are based on reference 31. Concentration factors for radionuclides in the marine environment were assumed as published in reference 32 and are also in Table 8. The pathways analysis, including meteorology, population distribution and radiological exposure rates was performed in a manner consistent with that employed by the U. S. Nuclear Regulatory Commission in reference 31.

Results of the analysis are summarized in Tables 9 and 10. Table 9 compares the estimated maximum exposure to a member of the public with guidelines of the Nuclear Regulatory Commission, although these guidelines are not applicable to nuclear-powered ships and their support facilities. These numerical guidelines on calculated radiation exposures have been issued by the Nuclear Regulatory Commission in reference 13 for implementing the concept that radioactivity in effluents from light water nuclear electric power reactors should be limited to amounts and quantities as low as reasonably achievable. The estimated maximum radiation exposure to a member of the general public from releases of airborne radioactivity is also much less than the standard of 10 millirem per year established by the Environmental Protection Agency in reference 33. Table 10 presents the estimated total whole body radiation exposure to the total population within 50 miles from the assumed radioactivity releases compared with the radiation exposure received by the same population from natural background radioactivity, as reported in references 12, 30 and 34. As shown in Tables 9 and 10, conservative estimates of the exposures to members of the public from the Naval Nuclear Propulsion Program are far less than the Environmental Protection Agency standards, the guidelines of the Nuclear Regulatory Commission, or the exposure from natural background radioactivity.

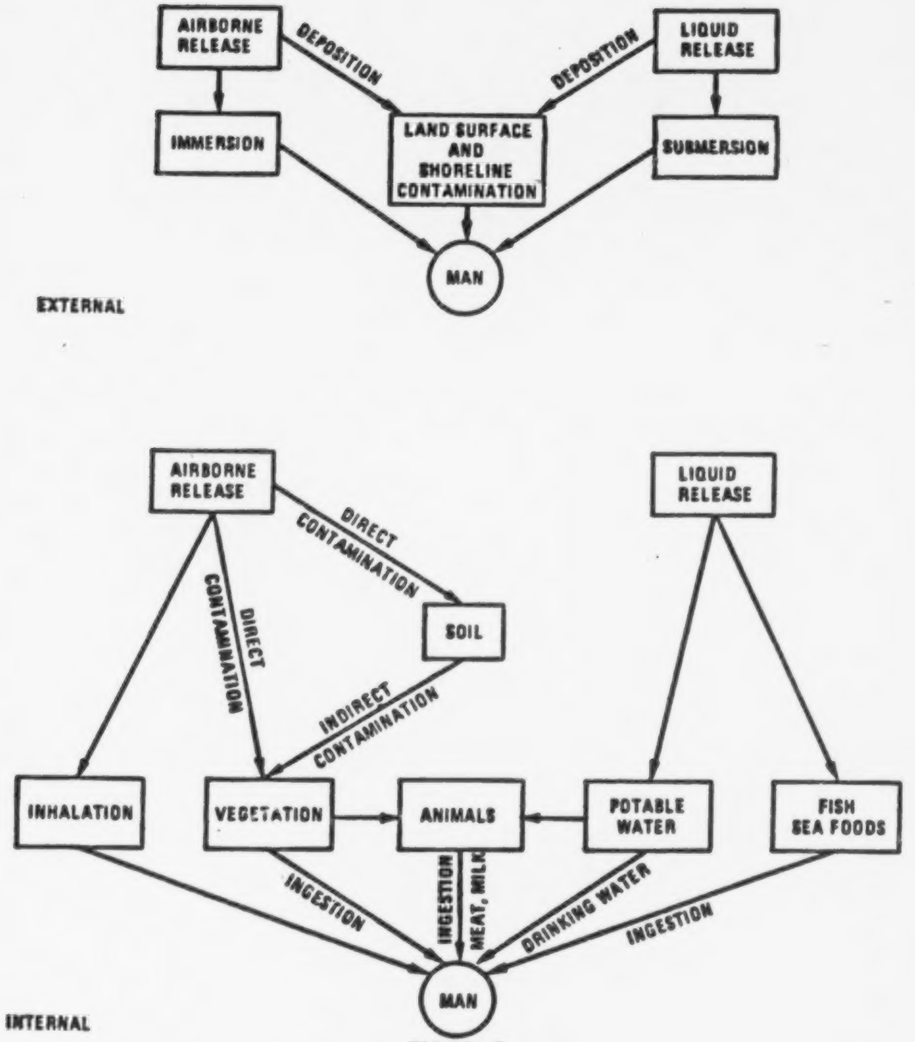
AIRBORNE RELEASE
DEPOSITION
DEPOSITION
LIQUID RELEASE
IMMERSION
LAND SURFACE AND SHORELINE CONTAMINATION
SUBMERSION
MAN
EXTERNAL
AIRBORNE RELEASE
DIRECT CONTAMINATION
LIQUID RELEASE
DIRECT CONTAMINATION
SOIL
INDIRECT CONTAMINATION
INHALATION
VEGETATION
ANIMALS
POTABLE WATER
FISH SEA FOODS
INGESTION
INGESTION
MEAT, MILK
DRINKING WATER
INGESTION
MAN
INTERNAL

FIGURE 5

PATHWAYS FOR EXTERNAL AND INTERNAL EXPOSURE OF MAN FROM AIRBORNE AND LIQUID RELEASES OF RADIOACTIVE EFFLUENTS

TABLE 7 RADIONUCLIDE RELEASES ASSUMED FOR ENVIRONMENTAL PATHWAYS ANALYSIS

	Assumed Annual Release, Curie	
Radionuclide	Liquid Release	Airborne Release
Cobalt 60	0.001	0.001
Tritium	0.100	0.001
Carbon 14	*	0.100
Krypton 83m	*	0.020
Krypton 85m	*	0.024
Krypton 87	*	0.050
Krypton 88	*	0.020
Xenon 131m	*	0.005
Xenon 133m	*	0.010
Xenon 133	*	0.210
Xenon 135	*	0.250
Argon 41	*	0.410

*These gaseous radionuclides are released into the air, not into water.

TABLE 8 ENVIRONMENTAL EXPOSURE TIMES, CONSUMPTION AND CONCENTRATION PARAMETERS ASSUMED FOR ENVIRONMENTAL PATHWAYS ANALYSIS

Pathway Parameter*	Assumed Parameter Value For Highest Individual	 For Average Individual
Fraction of Year Occupancy		
For Air Immersion	1	1
For Land Deposition	1	1
Along Shoreline	0.05	0.0005
Swimming	0.01	0.0001
Boating	0.01	0.0001
Food Consumption		
Leafy vegetables, Kg/year	72	18
Water, liters/year	730	180
Fish,** Kg/year	18	2.3
Mollusks,** Kg/year	9	0.25
Crustacea,** Kg/year	9	0.90
Sediment, Kg/year	1	0.10

* Refer to Figure 5

** Cobalt 60 was assumed to concentrate from sea water to the edible flesh of fish, mollusks, and crustacea by factors as follows: fish, 650; mollusks, 170; crustaceans, 1,700, based on reference 32.

TABLE 9 ESTIMATED MAXIMUM RADIATION EXPOSURE TO AN INDIVIDUAL FOR ASSUMED LIQUID AND AIRBORNE RADIOACTIVITY RELEASES FROM SHIPYARDS ENGAGED IN NAVAL NUCLEAR PROPULSION WORK

	Maximum Exposure To An Individual	
	NRC Guideline millirem/year	Estimated Value millirem/year
From Radionuclides In Liquid Releases	5 whole body, or any organ	less than 1
From Gaseous Radionuclides In Airborne Releases	5 whole body, or 15 skin	less than 1
From Other Radionuclides In Airborne Releases	15 any organ	less than 1

TABLE 10 ESTIMATED TOTAL WHOLE BODY RADIATION EXPOSURE TO GENERAL PUBLIC WITHIN 50 MILES FOR ASSUMED LIQUID AND AIRBORNE RADIOACTIVITY RELEASES FROM SHIPYARDS ENGAGED IN NAVAL NUCLEAR PROPULSION WORK

Exposure Due to Natural Background Radiation	Exposure Due to Assumed Radioactive Releases
Approximately 100,000 man-rem per year	less than 1 man-rem per year

AUDITS AND REVIEWS

The requirements and procedures for control of radioactivity is an important part of the training programs for everyone involved with radioactivity in the Naval Nuclear Propulsion Program. Such training is part of the initial qualification of shipyard workers and of Naval personnel assigned to ships and bases, and is required to be repeated regularly. Emphasis on this training is part of the concept that radiological control personnel alone cannot cause radiological work to be well performed; production and operations personnel and all levels of management are required to be involved in the control of radioactivity.

Checks and balances of several kinds are also set up to help ensure control of radioactivity. First, written procedures exist which require verbatim compliance. Radiological control personnel monitor various steps in radioactive waste processing. In each shipyard an independent organization, separate from the radiological control organization, audits all aspects of radioactive waste processing. Audits are performed by representatives from Naval Reactors headquarters who are assigned full time at each shipyard. Radiological control personnel from headquarters also conduct periodic inspections of each shipyard. In addition, shipyards have made detailed assessments of the environmental effects of shipyard operations and have published reports on the results of these assessments. Similarly, there are multiple levels of audits and inspections for the other Navy shore facilities, tenders, and nuclear-powered ships and for other radiologically controlled functions such as transportation. Even the smallest audit findings are followed up to ensure proper recovery and permanent corrective actions are taken and to help minimize the potential for future deficiencies.

The policy of the Navy is to provide for close cooperation and effective communication with state radiological officials involving occurrences that might cause concern because of radiological effects outside the ships or shore facilities. The Navy has reviewed radioactive waste disposal, radiological environmental monitoring, transportation and other radiological matters with state radiological officials in the states where Navy nuclear-powered ships are based or overhauled. Although there were no occurrences in 1989 which resulted in radiological effects to the public outside these facilities, states were notified when inquiries showed public interest in the possibility that such events had occurred. The Navy has encouraged states to conduct independent radiological environmental monitoring in harbors where Naval nuclear-powered ships are based or overhauled; the results of monitoring by states have been consistent with Navy results.

The U. S. Environmental Protection Agency has conducted detailed reviews of the Navy's procedures for controlling radioactive waste and for radiological environmental monitoring. An Environmental Protection Agency laboratory has conducted detailed environmental surveys of selected U. S. harbors (references 25 and 35 through 43). This laboratory has performed these surveys in the harbors at Pascagoula, Mississippi; Charleston, South Carolina; Pearl Harbor, Hawaii; San Diego, Alameda, San Francisco and Vallejo, California; New London and Groton, Connecticut; Newport News, Portsmouth and Norfolk, Virginia; Bremerton and Bangor, Washington; Kings Bay, Georgia; and Kittery, Maine-Portsmouth, New Hampshire. Environmental Protection Agency results have been consistent with Navy results. The Environmental Protection Agency reports have concluded that operation of Naval nuclear-powered ships has had no adverse impact on public safety or health.

CONCLUSIONS

1. The total gamma radioactivity in liquids released into all ports and harbors from the U. S. Naval Nuclear Propulsion Program was less than 0.002 curie in 1989.

2. No increase of radioactivity above normal background levels has been detected in harbor water where U. S. Naval nuclear-powered ships are based, overhauled, or constructed.

3. Liquid releases from U. S. Naval nuclear-powered ships and their support facilities have not caused a measurable increase in the general background radioactivity of the environment.

4. Low-level cobalt 60 radioactivity in harbor bottom sediment is detectable around a few operating base and shipyard piers from low level liquid releases in the 1960's. Concentrations of cobalt 60 are less than the concentrations of naturally occurring radionuclides around these piers. Cobalt-60 is not detectable in general harbor bottom areas away from these piers. The maximum total radioactivity observed in a U. S. harbor of less than 0.05 curie of cobalt 60 is small compared to the naturally occurring radioactivity. Comparison to previous environmental data summarized in references 1 through 5 shows that these environmental cobalt 60 levels are continuing to decrease.

5. Conservative estimates of radiation exposures to members of the public from the Naval Nuclear Propulsion Program are far less than either the Environmental Protection Agency environmental standards, the guidelines of the Nuclear Regulatory Commission or the exposure from natural background radioactivity.

6. Procedures used by the Navy to control releases of radioactivity from U. S. Naval nuclear-powered ships and their support facilities have been effective in protecting the environment and the health and safety of the general public. Independent radiological environmental monitoring performed by the U. S. Environmental Protection Agency and states have confirmed the adequacy of these procedures. These procedures have ensured that no member of the general public has received measurable radiation exposure as a result of current operations of the Naval Nuclear Propulsion Program.

REFERENCES

(1) U. S. Navy Reports, "Disposal of Radioactive Wastes from U. S. Naval Nuclear-Powered Ships and Their Support Facilities", M. E. Miles et al, for calendar years 1965 through 1969 published in Radiation Health Data and Reports; May 1966, December 1967, April 1969, September 1969 and August 1970.

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APPENDIX
ENVIRONMENTAL MONITORING SURVEY CHARTS

Environmental monitoring survey charts for harbors monitored for radioactivity associated with U. S. Naval nuclear-powered ships in the U. S. and possessions during 1989 are listed below and included in this Appendix. The sampling locations for harbor water and harbor sediment are shown. In addition, shoreline survey areas and the locations of posted dosimetry devices are shown on the figures.

Figure No.	Location
	California
1	U. S. Naval Air Station, Alameda
2	Hunters Point Shipyard, San Francisco
3	Mare Island Naval Shipyard, Vallejo
4	San Diego Harbor
5	San Diego Harbor, Ballast Point Area
	Connecticut
6	Electric Boat Division, Groton
7	U. S. Naval Submarine Support Facility, New London Harbor
8	State Pier Area, New London
	Florida
9	Port Canaveral
	Georgia
10	U. S. Naval Submarine Support Facility, Kings Bay, St. Marys
	Guam
11	Apra Harbor
	Hawaii
12	Pearl Harbor Area
13	Pearl Harbor Naval Shipyard
14	U. S. Naval Submarine Base, Pearl Harbor
	New Hampshire/Maine
15	Portsmouth Naval Shipyard
	South Carolina
16	U. S. Naval Station and Naval Shipyard, Charleston
17	U. S. Naval Weapons Station, Charleston

Virginia
18 Newport News Shipbuilding and Dry Dock Co., Newport News
19 Norfolk Naval Shipyard, Portsmouth
20 U. S. Naval Station Norfolk, Destroyer and Submarine Piers
21 Norfolk--Portsmouth Virginia Area

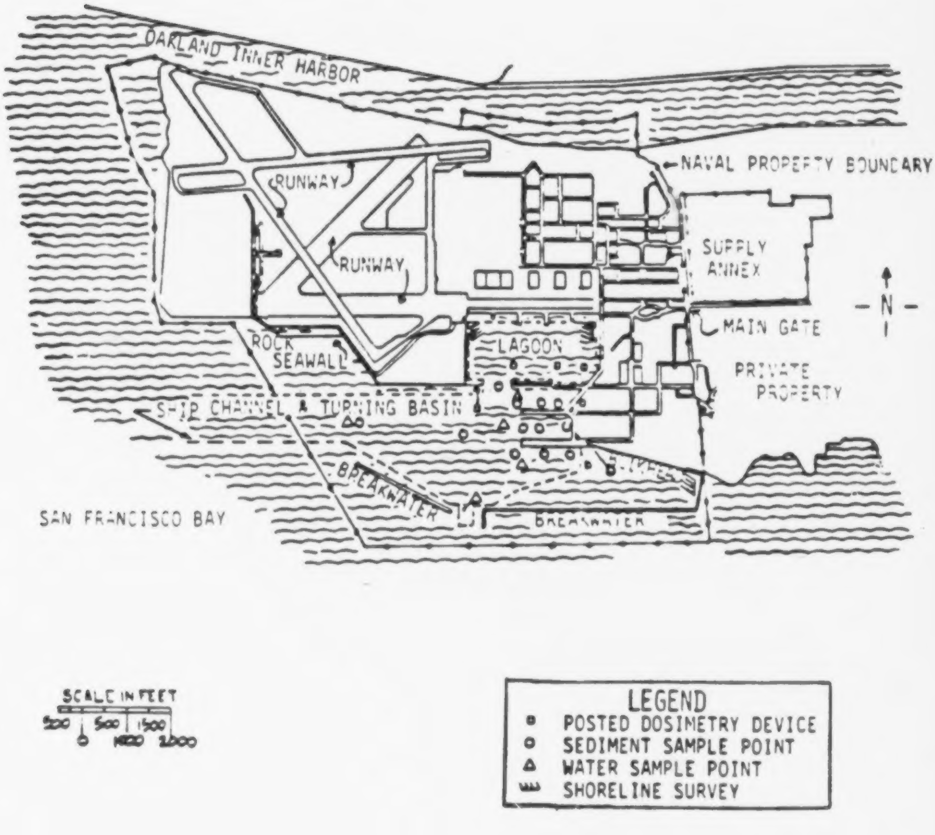
Washington
22 Puget Sound Naval Shipyard
23 Bangor/Hood Canal

FIGURE 1

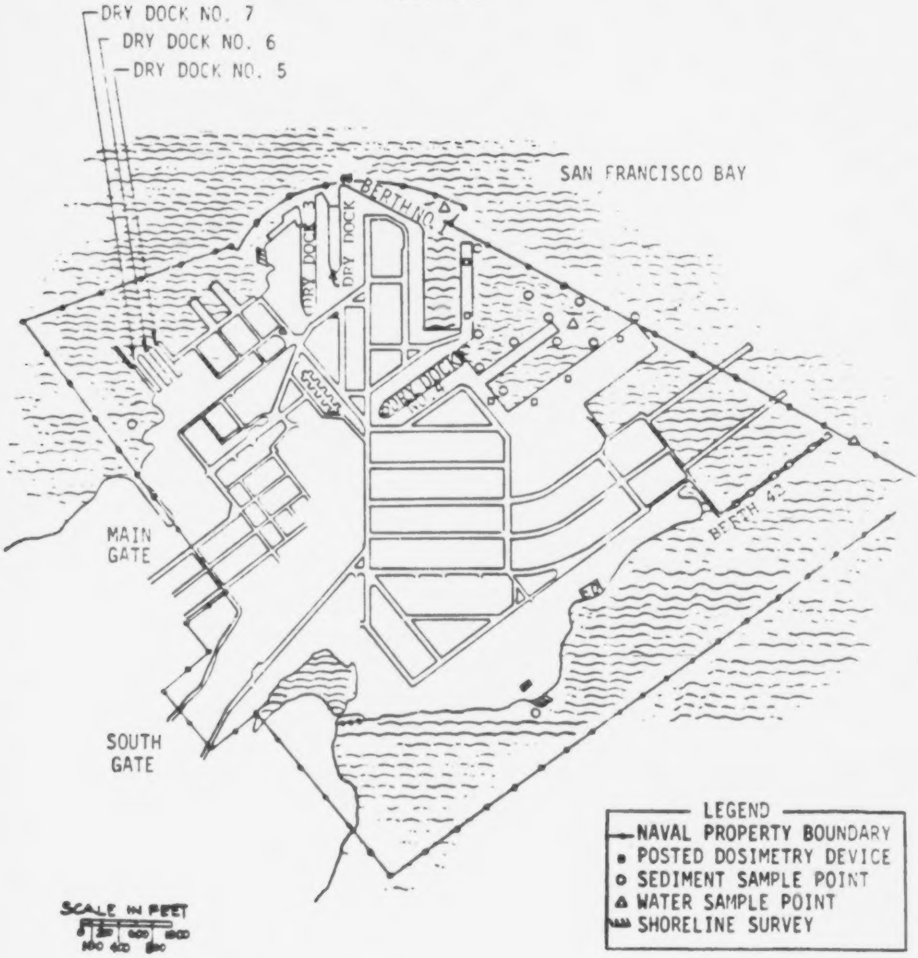
ENVIRONMENTAL MONITORING LOCATIONS

AT THE U. S. NAVAL AIR STATION

ALAMEDA, CALIFORNIA

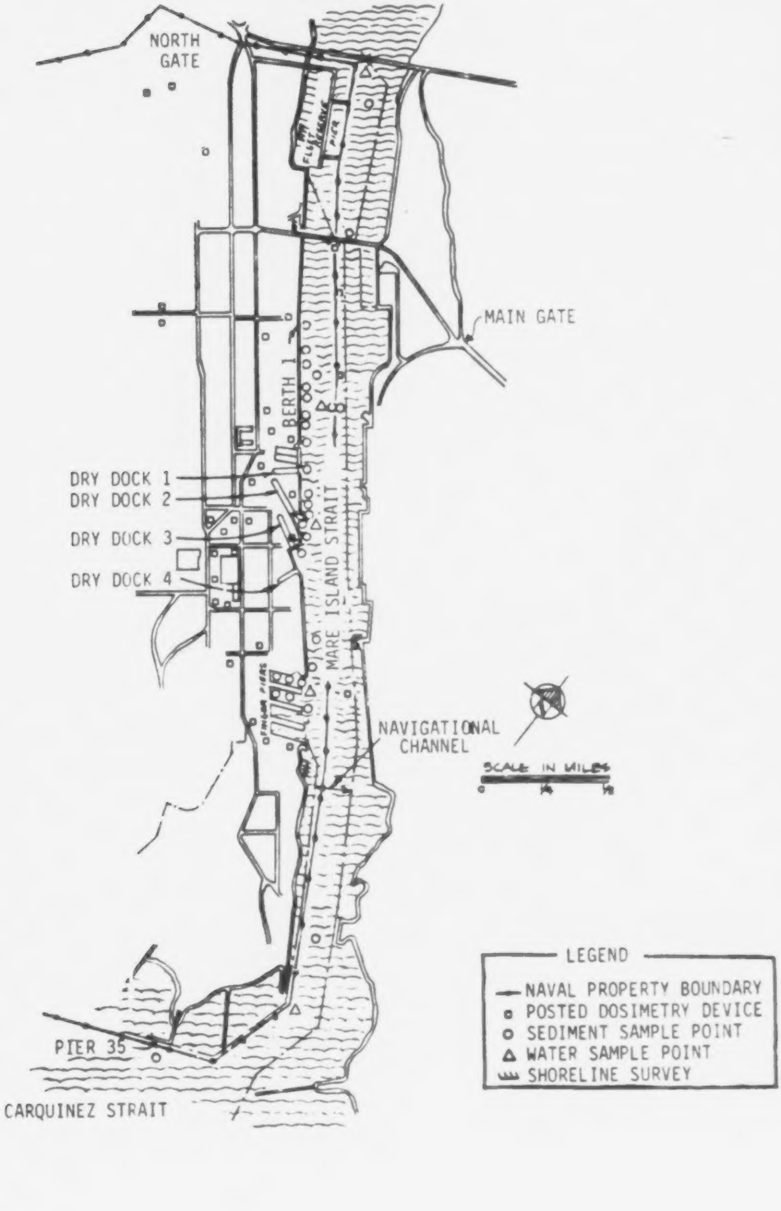

OAKLAND INNER HARBOR
NAVAL PROPERTY BOUNDARY
RUNWAY
RUNWAY
SUPPLY ANNEX
N
MAIN GATE
ROCK SEAWALL
LAGOON
PRIVATE PROPERTY
SHIP CHANNEL & TURNING BASIN
BREAKWATER
BREAKWATER
SAN FRANCISCO BAY
SCALE IN FEET
500
0
500
1000
1500
2000
LEGEND
POSTED DOSIMETRY DEVICE
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT
SHORELINE SURVEY

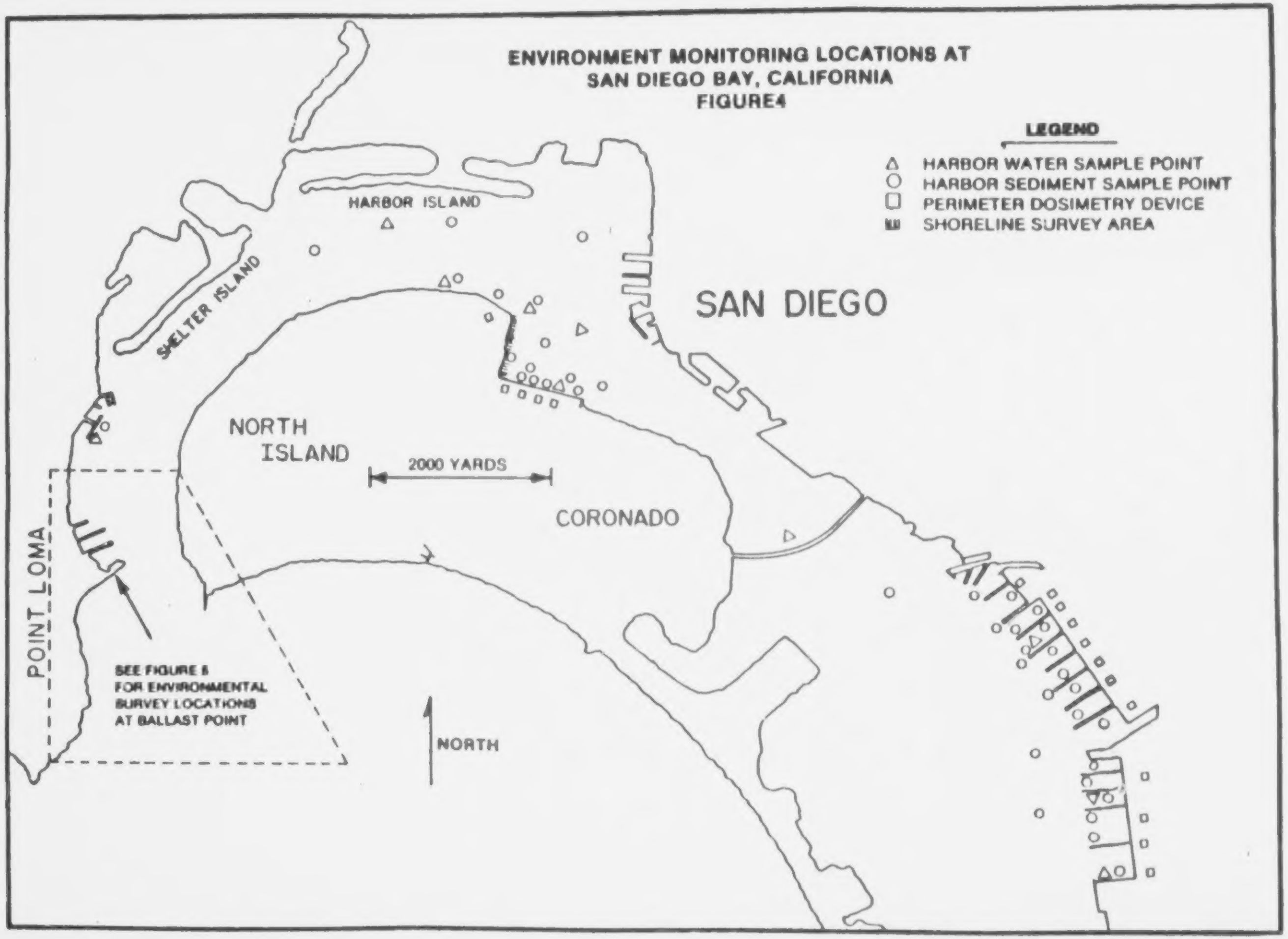
ENVIRONMENTAL MONITORING LOCATIONS AT THE
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA
FIGURE 2


DRY DOCK NO. 7
DRY DOCK NO. 6
DRY DOCK NO. 5
SAN FRANCISCO BAY
BERTH NO. 1
DRY DOCK 3
DRY DOCK
DRY DOCK 4
BERTH 42
MAIN GATE
SOUTH GATE
LEGEND
NAVAL PROPERTY BOUNDARY
● POSTED DOSIMETRY DEVICE
○ SEDIMENT SAMPLE POINT
△ WATER SAMPLE POINT
SHORELINE SURVEY
SCALE IN FEET
0
200
600
1000
400
800

ENVIRONMENTAL MONITORING LOCATIONS AT THE
MARE ISLAND NAVAL SHIPYARD
VALLEJO, CALIFORNIA

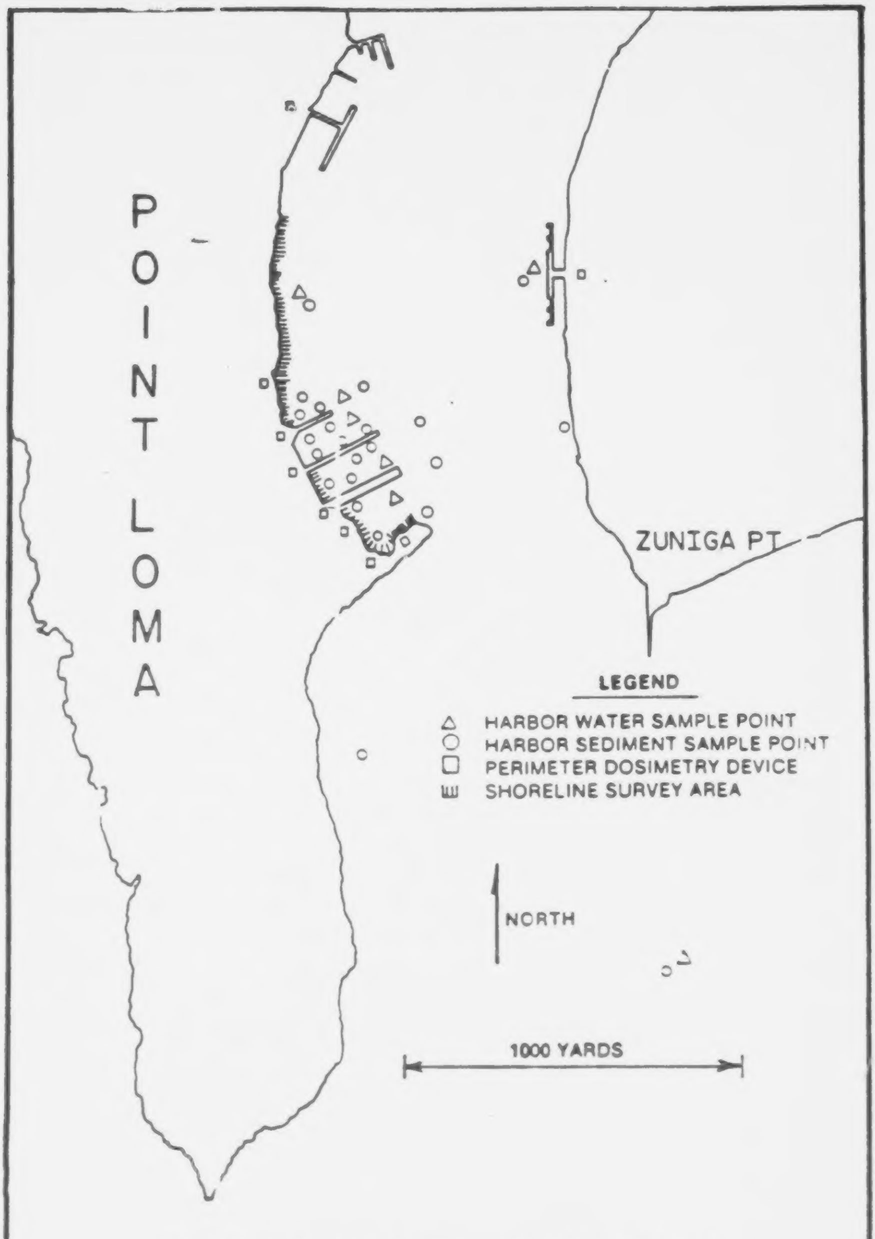
FIGURE 3


NORTH GATE
FLEET RESERVE PIER
MAIN GATE
BERTH 1
DRY DOCK 1
DRY DOCK 2
DRY DOCK 3
DRY DOCK 4
MARE ISLAND STRAIT
NAVIGATIONAL CHANNEL
SCALE IN MILES
0
1/4
1/2
LEGEND
NAVAL PROPERTY BOUNDARY
POSTED DOSIMETRY DEVICE
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT
SHORELINE SURVEY
PIER 35
CARQUINEZ STRAIT



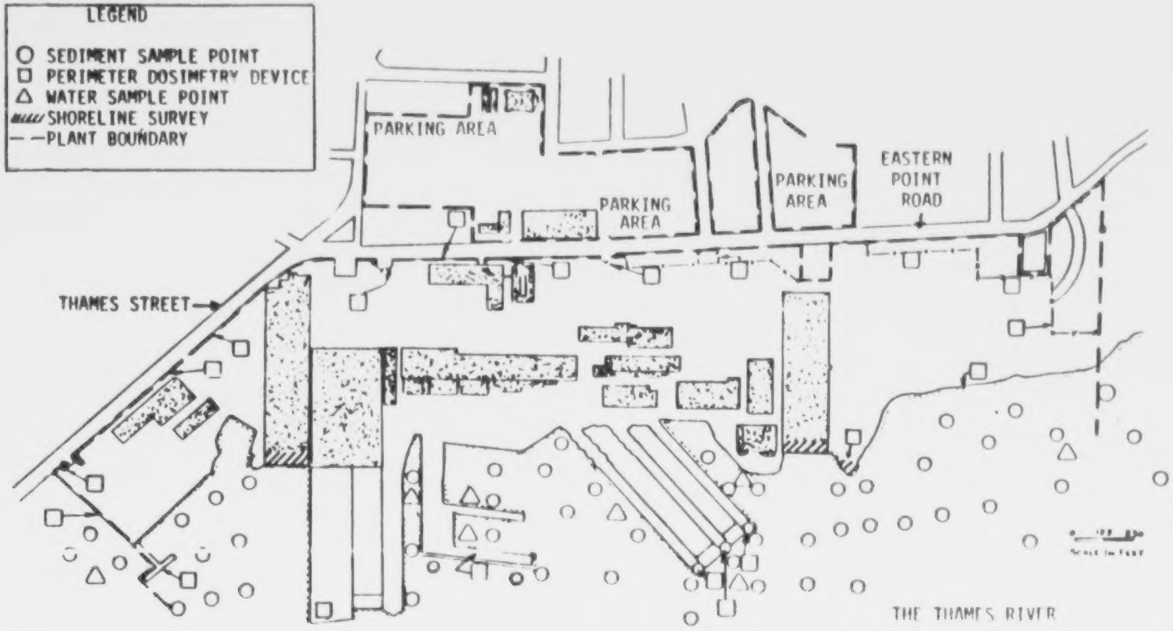
ENVIRONMENT MONITORING LOCATIONS AT SAN DIEGO BAY, CALIFORNIA
FIGURE4

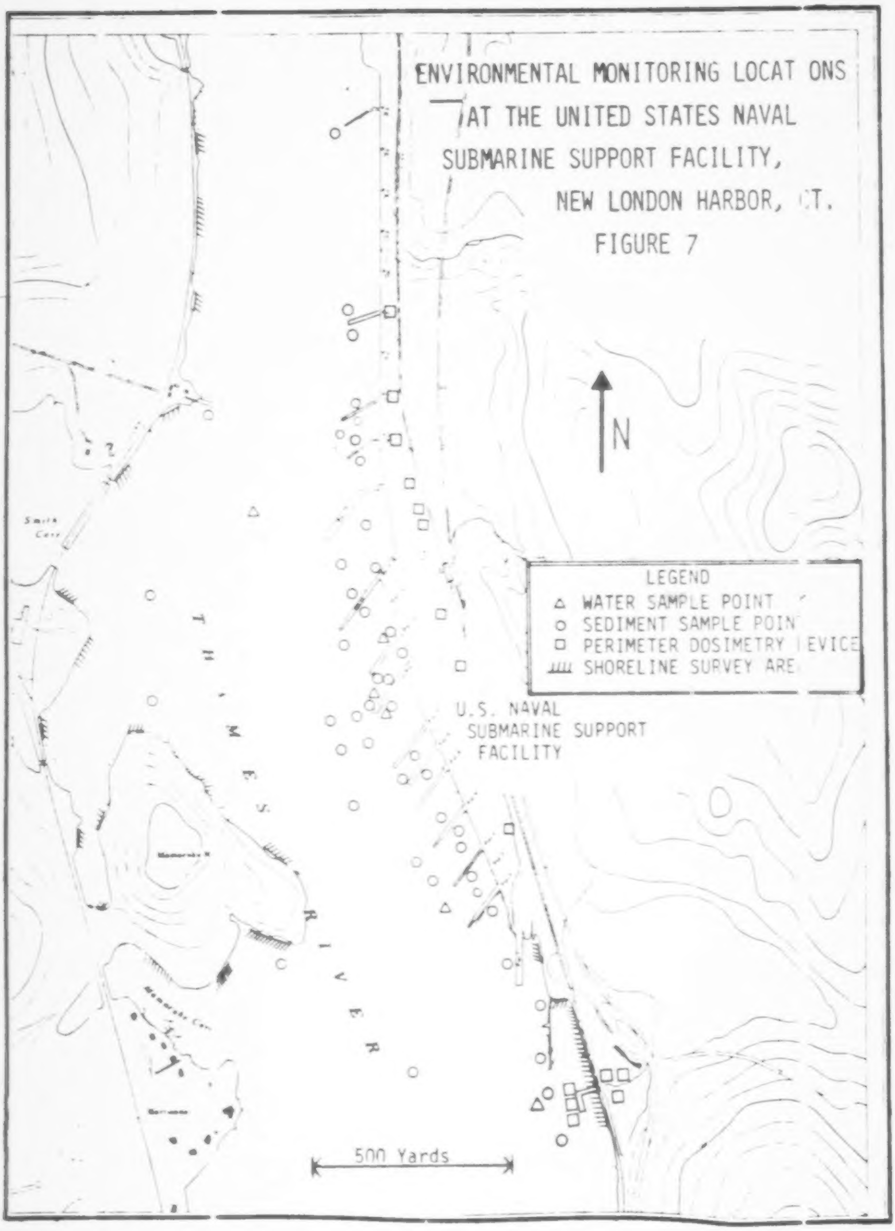
LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
▥ SHORELINE SURVEY AREA
HARBOR ISLAND
SHELTER ISLAND
SAN DIEGO
NORTH ISLAND
2000 YARDS
CORONADO
POINT LOMA
SEE FIGURE 5 FOR ENVIRONMENTAL SURVEY LOCATIONS AT BALLAST POINT
NORTH


POINT LOMA
ZUNIGA PT
LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
ш SHORELINE SURVEY AREA
NORTH
1000 YARDS

ENVIRONMENTAL MONITORING LOCATIONS AT SAN DIEGO BAY, CALIFORNIA
FIGURE 5

ENVIRONMENTAL MONITORING LOCATIONS
AT GENERAL DYNAMICS/ELECTRIC BOAT
GROTON, CT.
FIGURE 6


LEGEND
○ SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
△ WATER SAMPLE POINT
▨ SHORELINE SURVEY
— —PLANT BOUNDARY
PARKING AREA
PARKING AREA
PARKING AREA
EASTERN POINT ROAD
THAMES STREET
THE THAMES RIVER



ENVIRONMENTAL MONITORING LOCATIONS AT THE UNITED STATES NAVAL SUBMARINE SUPPORT FACILITY, NEW LONDON HARBOR, CT.

FIGURE 7

N
LEGEND
△ WATER SAMPLE POINT
○ SEDIMENT SAMPLE POIN
□ PERIMETER DOSIMETRY EVICE
SHORELINE SURVEY ARE
THAMES RIVER
U.S. NAVAL SUBMARINE SUPPORT FACILITY
Smith Cove
500 Yards

ENVIRONMENTAL MONITORING LOCATIONS
AT STATE PIER AREA, NEW LONDON, CT
FIGURE 8

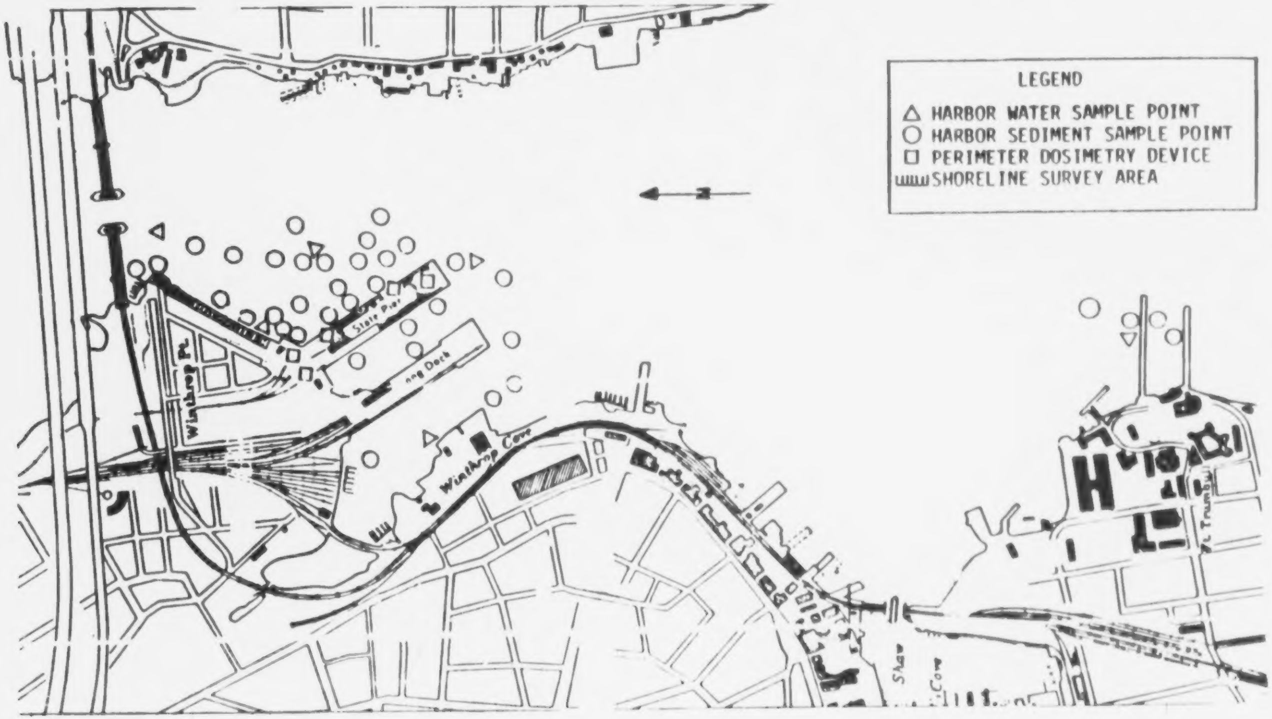
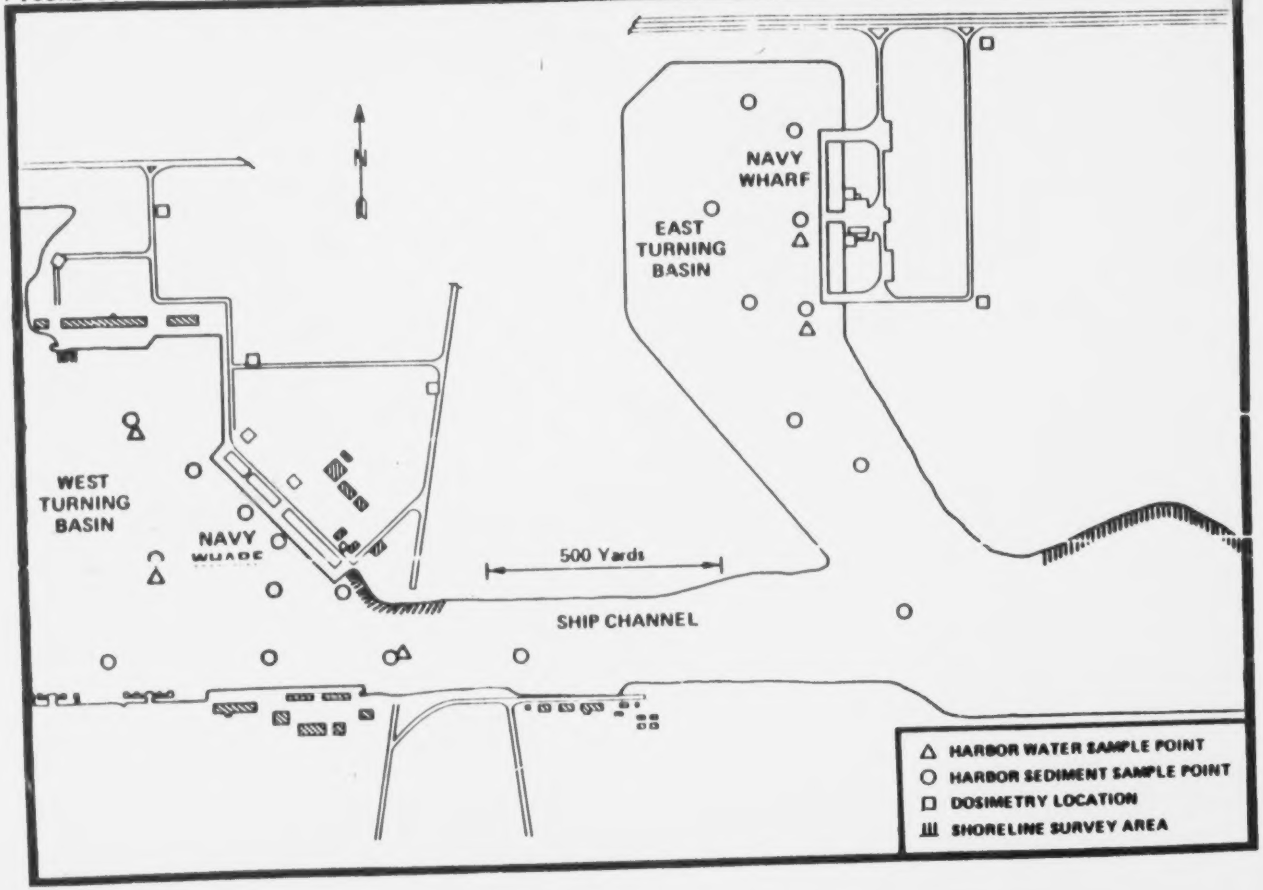

LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
ꟾꟾꟾꟾ SHORELINE SURVEY AREA
N
Winthrop Pt.
State Pier
ng Dock
Winthrop Cove
Shaw
Cove
Ft. Trumbull

FIGURE 9. ENVIRONMENTAL MONITORING LOCATIONS AT PORT CANAVERAL, FLORIDA


N
NAVY WHARF
EAST TURNING BASIN
WEST TURNING BASIN
NAVY WHARF
500 Yards
SHIP CHANNEL
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ DOSIMETRY LOCATION
Ш SHORELINE SURVEY AREA

ENVIRONMENTAL MONITORING LOCATIONS AT
KINGS BAY SUBMARINE SUPPORT FACILITY

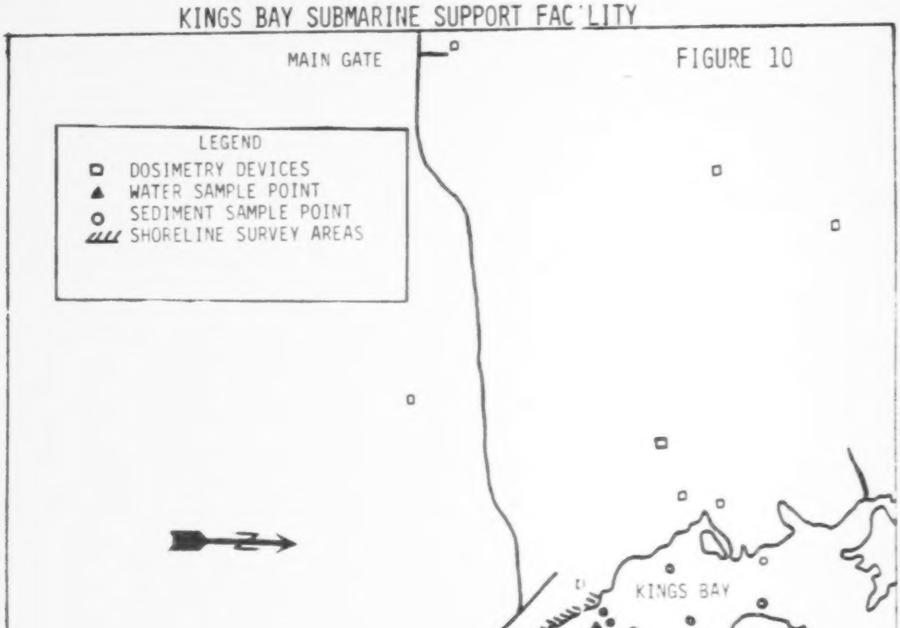


FIGURE 10

MAIN GATE
LEGEND
DOSIMETRY DEVICES
WATER SAMPLE POINT
SEDIMENT SAMPLE POINT
SHORELINE SURVEY AREAS
N
KINGS BAY
PIER
CRAB ISLAND
0
1000
2000
SCALE IN FEET
CUMBERLAND SOUND
STAFFORD ISLAND
DRUM POINT ISLAND
CUMBERLAND ISLAND

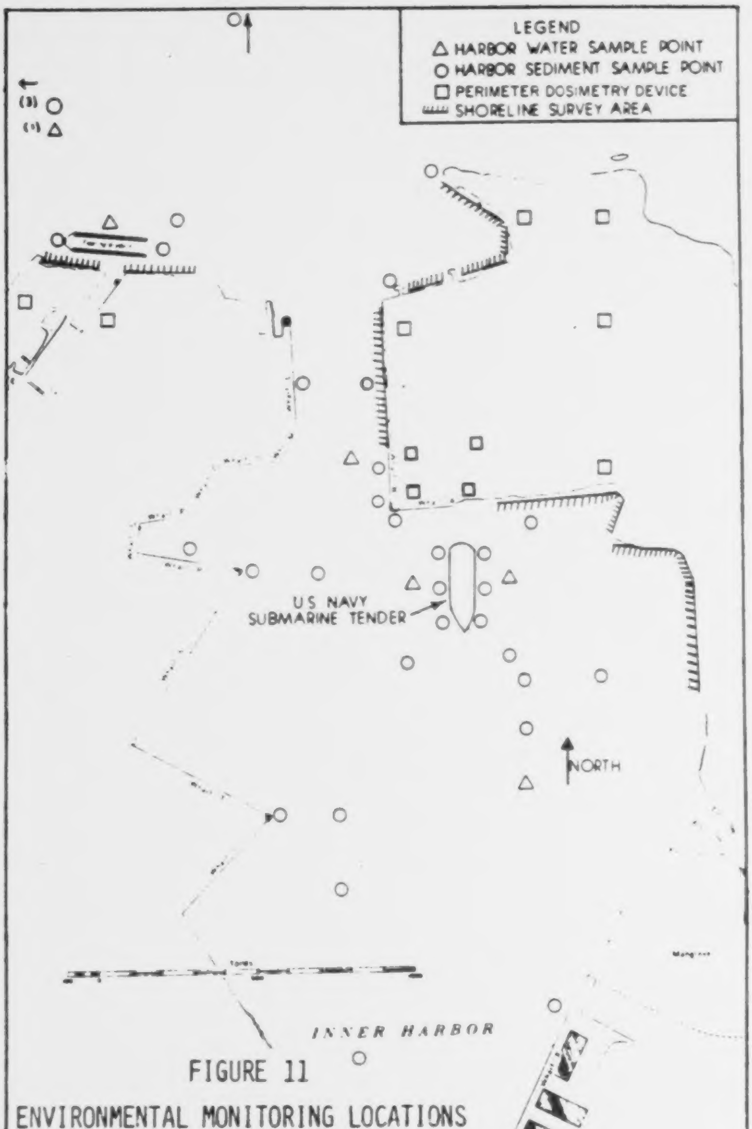
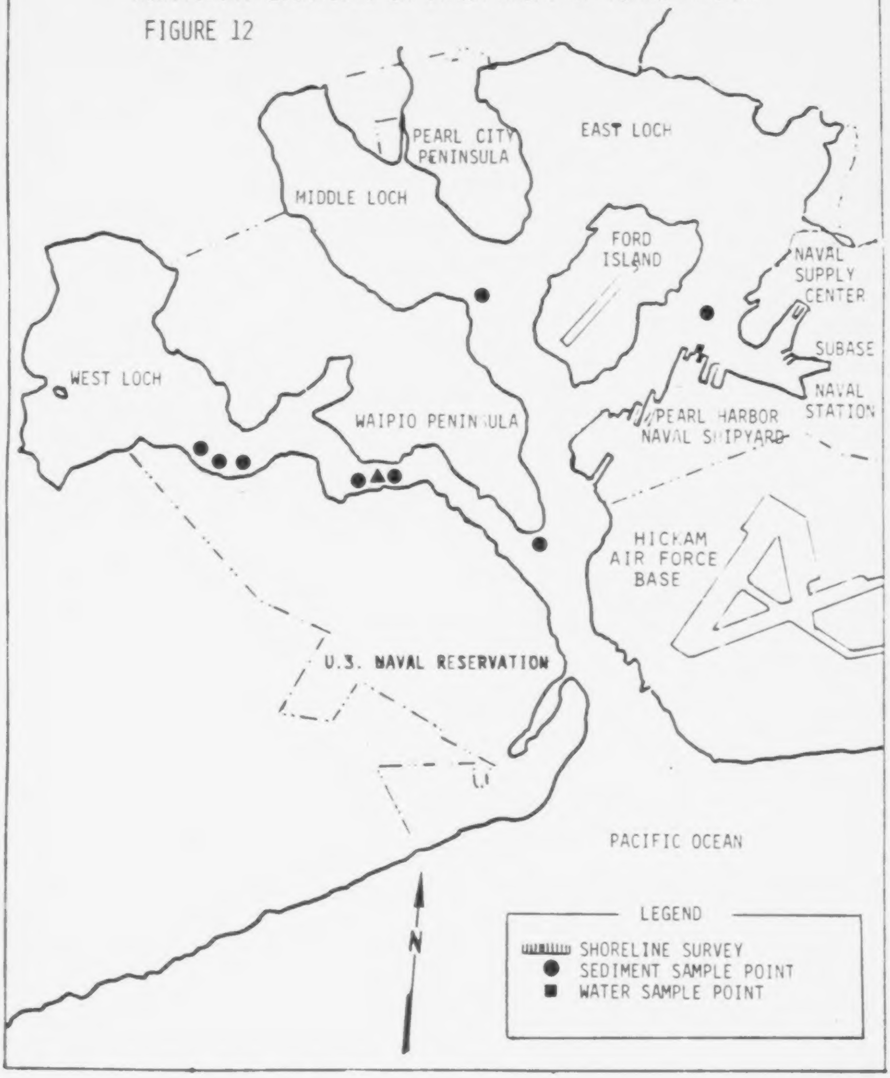

LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
☐ PERIMETER DOSIMETRY DEVICE
SHORELINE SURVEY AREA
(3) ○
(1) △
U S NAVY
SUBMARINE TENDER
NORTH
INNER HARBOR
APRA HARBOR

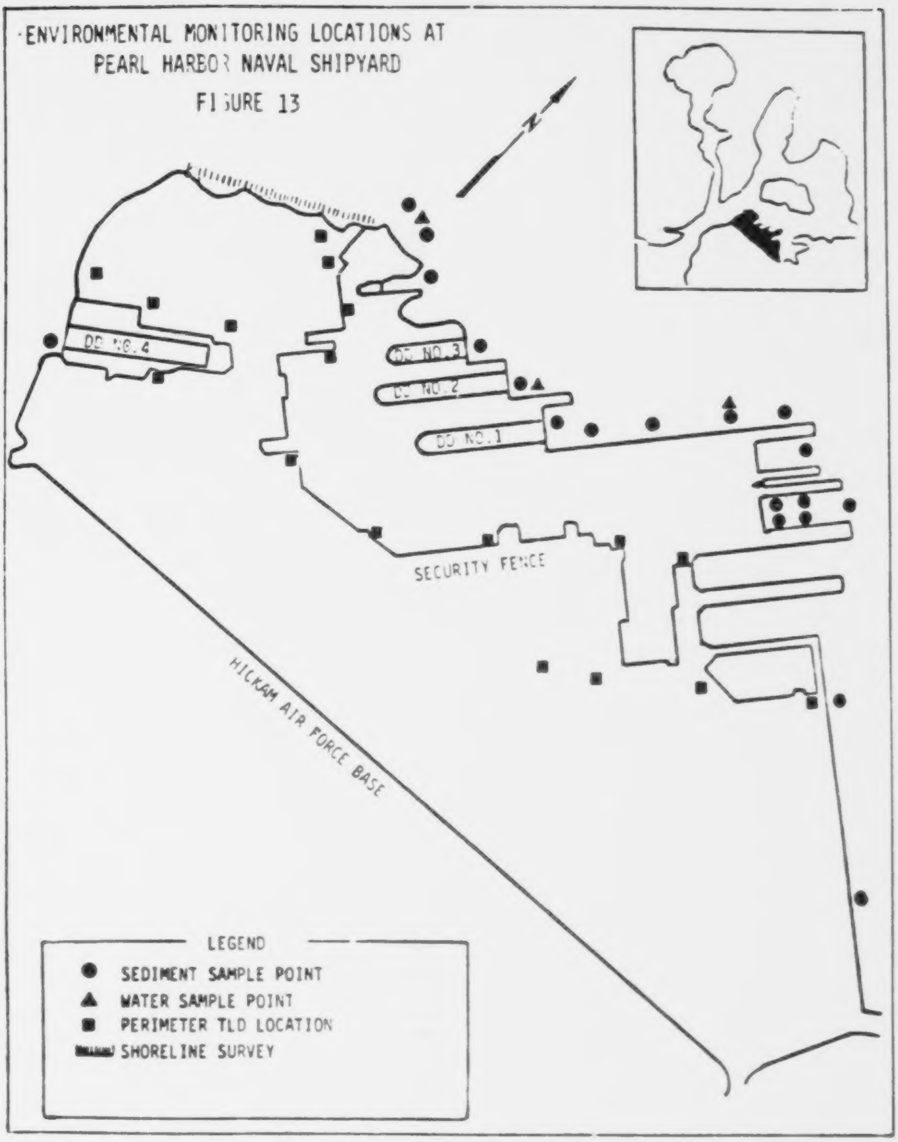
FIGURE 11

ENVIRONMENTAL MONITORING LOCATIONS
MARIANAS - GUAM

OVERALL MAP OF PEARL HARBOR SHOWING ENVIRONMENTAL MONITORING LOCATIONS IN OTHER AREAS OF PEARL HARBOR

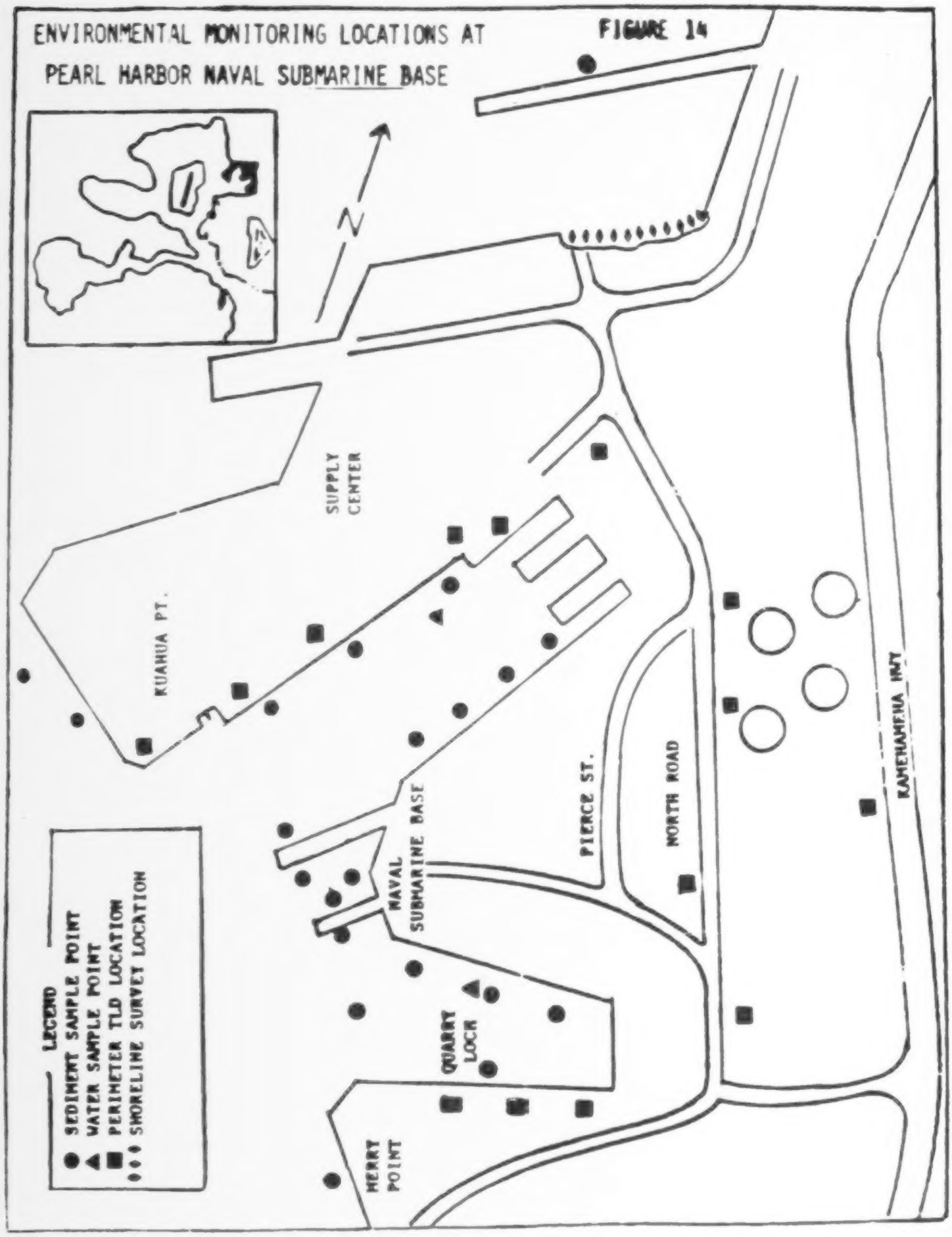
FIGURE 12


PEARL CITY PENINSULA
EAST LOCH
MIDDLE LOCH
FORD ISLAND
NAVAL SUPPLY CENTER
SUBASE
NAVAL STATION
WEST LOCH
WAIPIO PENINSULA
PEARL HARBOR NAVAL SHIPYARD
HICKAM AIR FORCE BASE
U.S. NAVAL RESERVATION
PACIFIC OCEAN
N
LEGEND
SHORELINE SURVEY
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT



ENVIRONMENTAL MONITORING LOCATIONS AT
PEARL HARBOR NAVAL SHIPYARD
FIGURE 13

N
DD NO.4
DD NO.3
DD NO.2
DD NO.1
SECURITY FENCE
HICKAM AIR FORCE BASE
LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
■ PERIMETER TLD LOCATION
SHORELINE SURVEY



ENVIRONMENTAL MONITORING LOCATIONS AT PEARL HARBOR NAVAL SUBMARINE BASE

FIGURE 14

N
SUPPLY CENTER
KUAHUA PT.
NAVAL SUBMARINE BASE
PIERCE ST.
NORTH ROAD
KAMEHAMEHA HWY
QUARRY LOCK
MERRY POINT
LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
■ PERIMETER TLD LOCATION
••• SHORELINE SURVEY LOCATION

ENVIRONMENTAL MONITORING LOCATIONS
AT PORTSMOUTH NAVAL SHIPYARD
PORTSMOUTH-KITTERY HARBOR
FIGURE 15

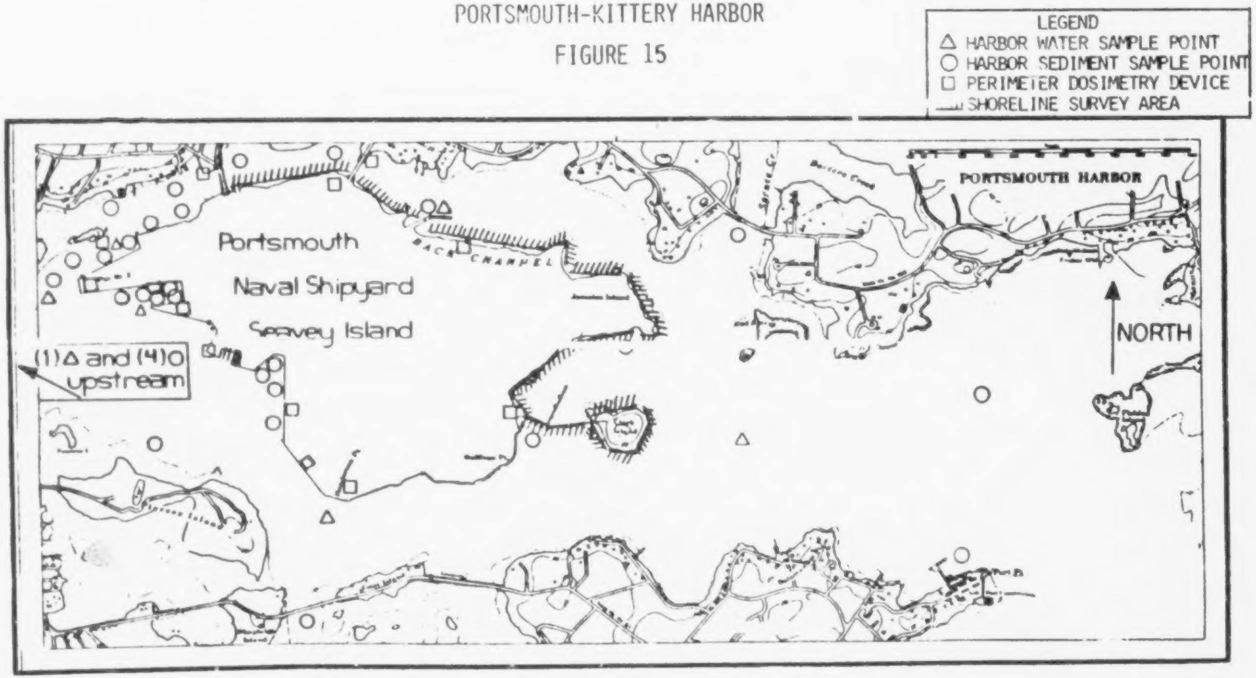

LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
SHORELINE SURVEY AREA
PORTSMOUTH HARBOR
NORTH
Portsmouth
Naval Shipyard
Seavey Island
BACK CHANNEL
(1)△ and (4)○ upstream

FIGURE 16 U.S. NAVAL STATION & NAVAL SHIPYARD, CHARLESTON, SC.

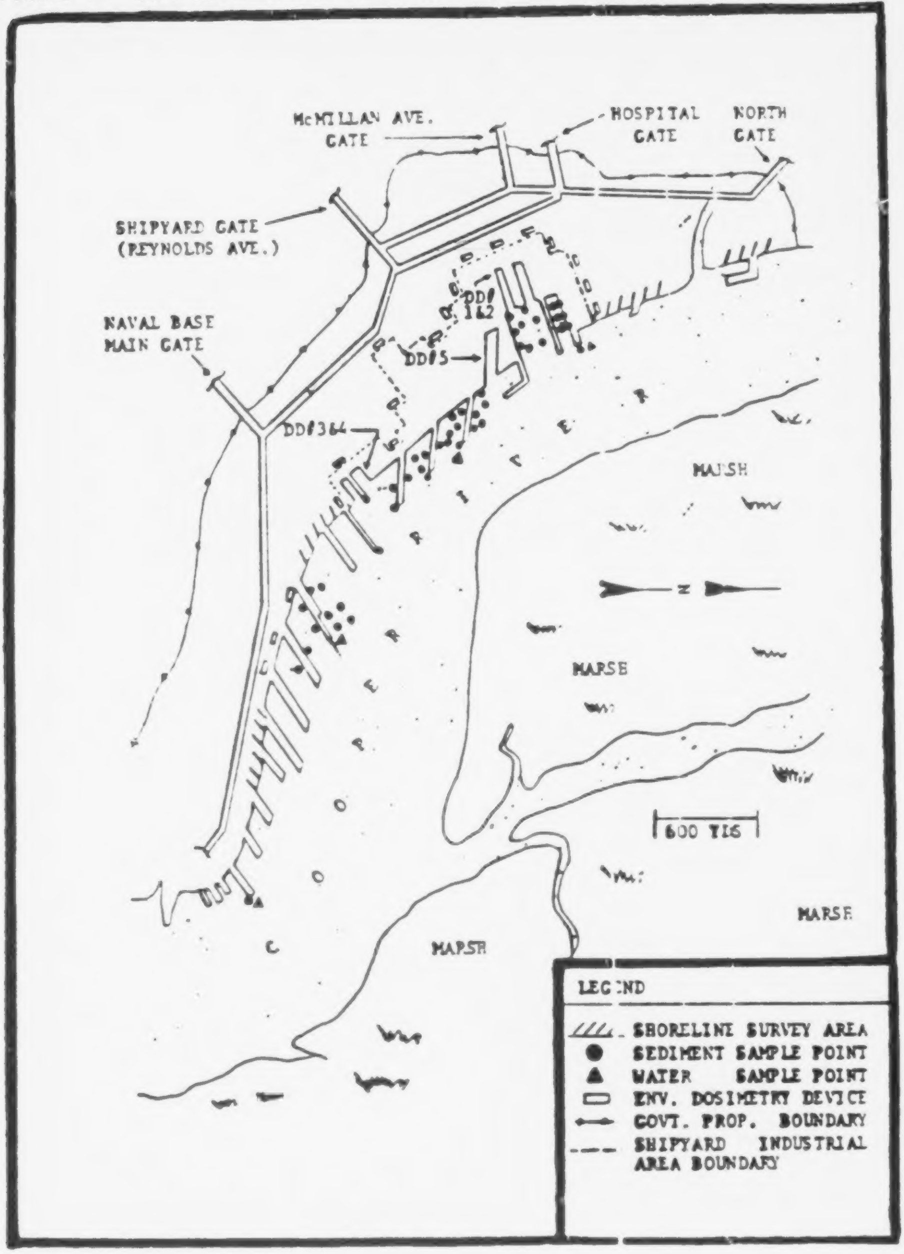
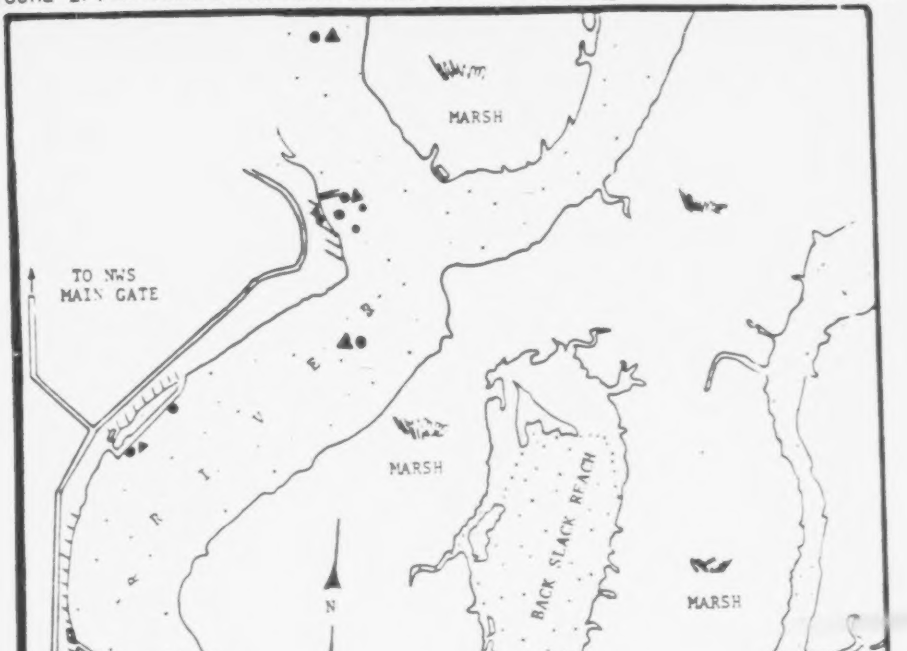

McMILLAN AVE. GATE
HOSPITAL GATE
NORTH GATE
SHIPYARD GATE (REYNOLDS AVE.)
NAVAL BASE MAIN GATE
DD# 1&2
DD#5
DD#3&4
COOPER RIVER
MARSH
MARSH
MARSH
MARSH
N
600 YDS
LEGEND
SHORELINE SURVEY AREA
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT
ENV. DOSIMETRY DEVICE
GOVT. PROP. BOUNDARY
SHIPYARD INDUSTRIAL AREA BOUNDARY

FIGURE 17. ENVIRONMENTAL MONITORING, U.S. NAVAL WEAPONS STATION, CHARLESTON


MARSH
TO NWS MAIN GATE
COOPER RIVER
MARSH
BACK SLACK REACH
MARSH
N
500 YDS
FLOATING DRY DOCK
LEGEND
SHORELINE SURVEY AREA
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT
ENV. DOSIMETRY DEVICE

ENVIRONMENTAL MONITORING LOCATIONS
AT NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY
FIGURE 18

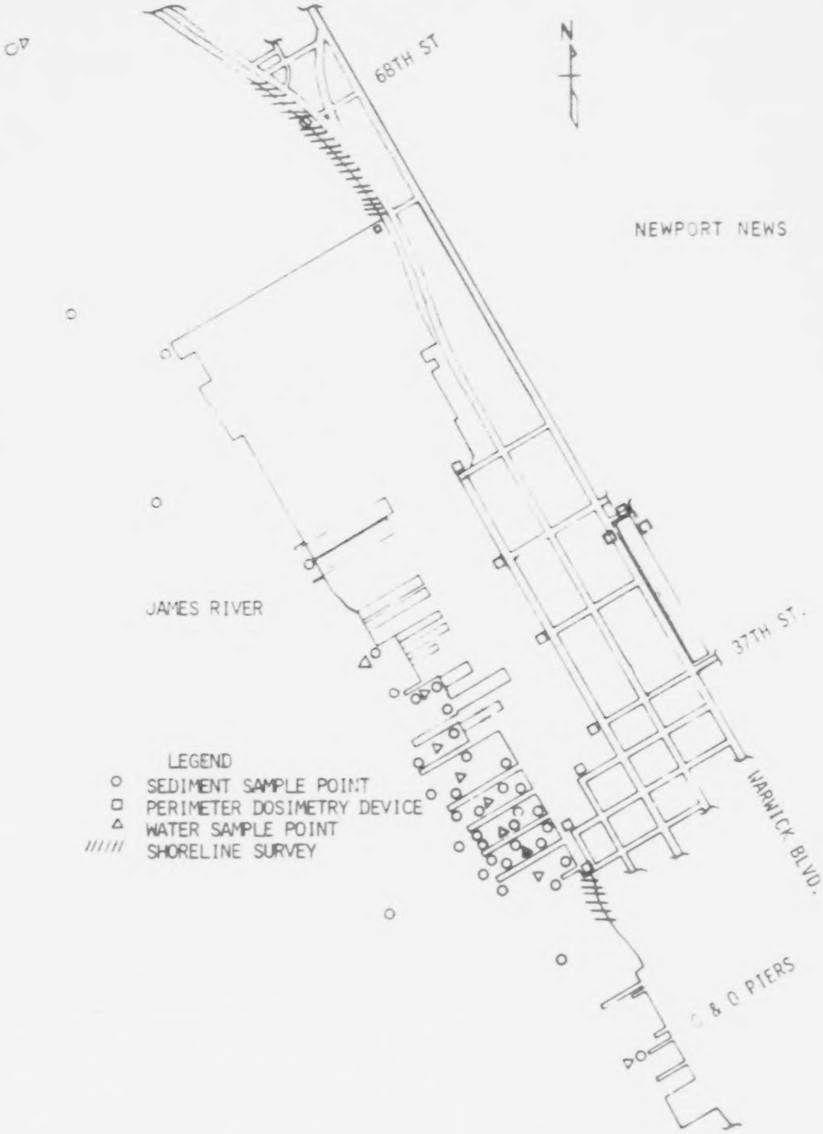

68TH ST
N
NEWPORT NEWS
JAMES RIVER
37TH ST.
WARWICK BLVD.
C & O PIERS
LEGEND
○ SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
△ WATER SAMPLE POINT
///// SHORELINE SURVEY

FIGURE 19 ENVIRONMENTAL MONITORING LOCATIONS AT NORFOLK NAVAL SHIPYARD, PORTSMOUTH, VA

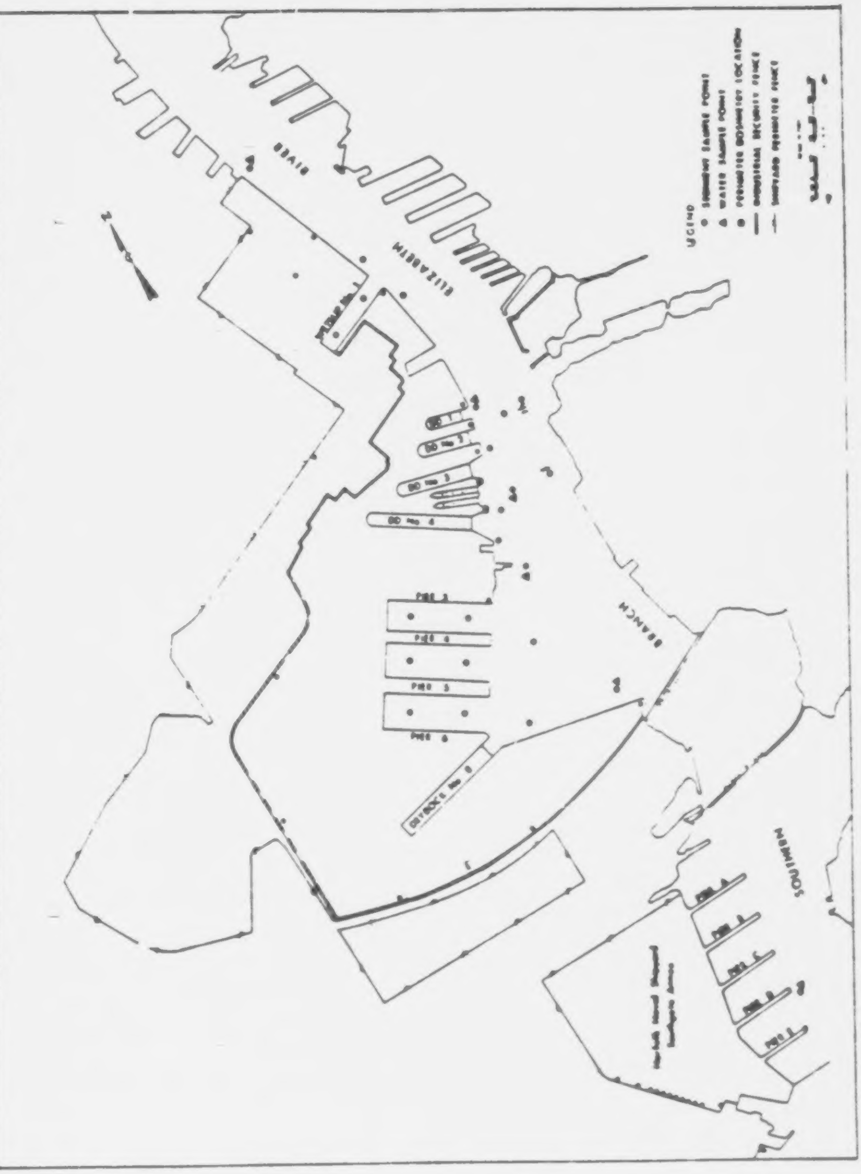

N
ELIZABETH
RIVER
SOUTHERN
BRANCH
DD No 1
DD No 2
DD No 3
DD No 4
PIER 3
PIER 4
PIER 5
PIER 6
DRYDOCK No 8
PIER A
PIER B
PIER C
PIER D
PIER E
LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
● PERIMETER DOSIMETRY LOCATION
INDUSTRIAL SECURITY FENCE
SHIPYARD PERIMETER FENCE

FIGURE 20: ENVIRONMENTAL MONITORING LOCATIONS AT NORFOLK NAVAL STATION

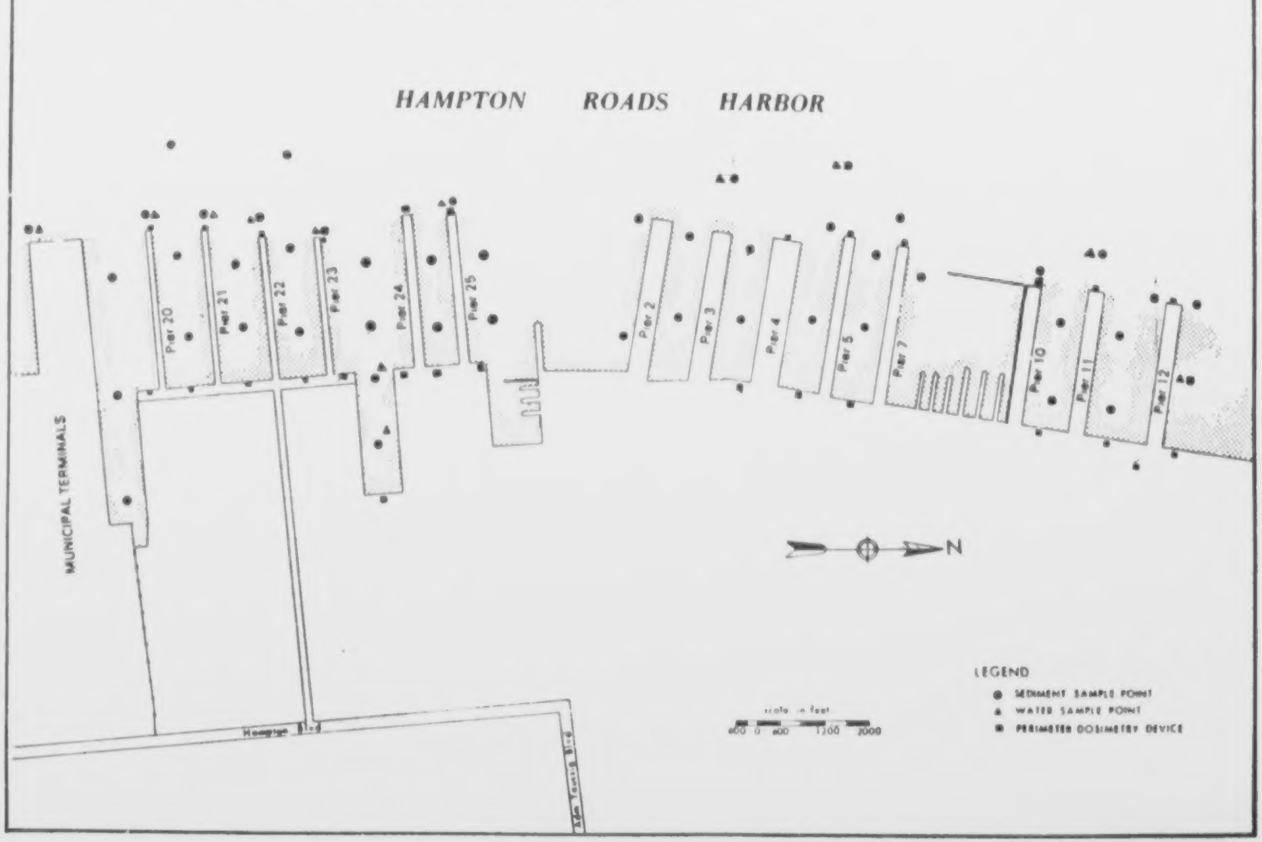
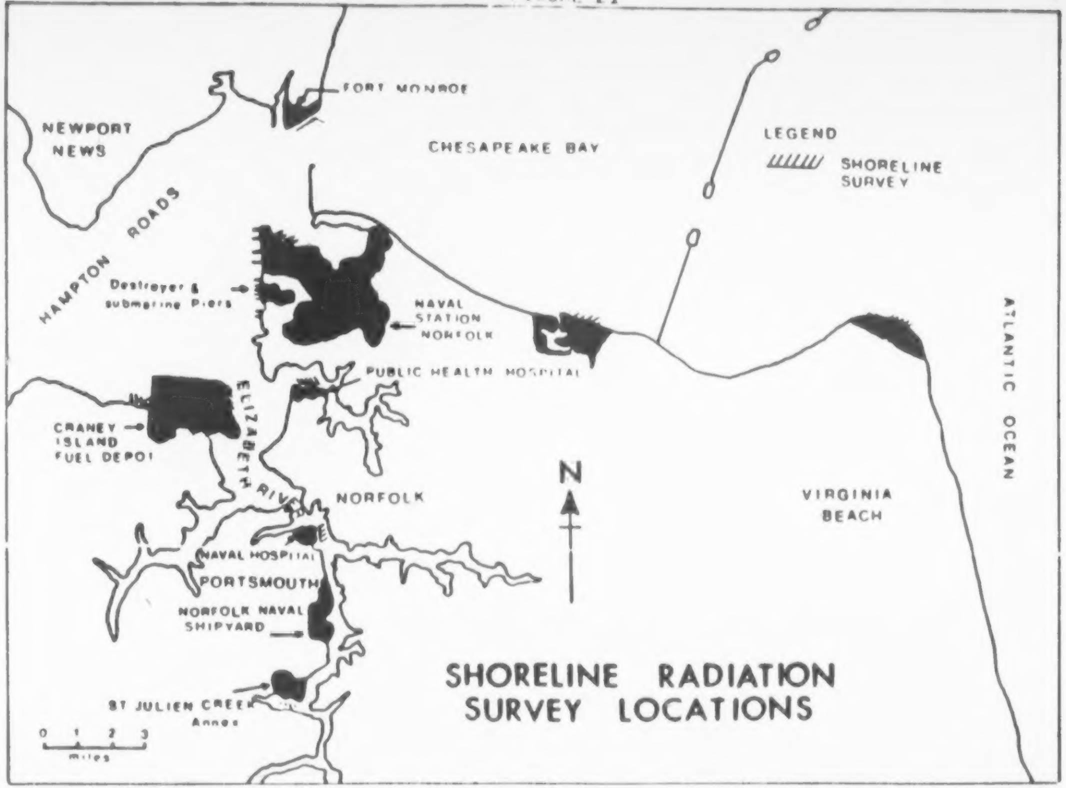
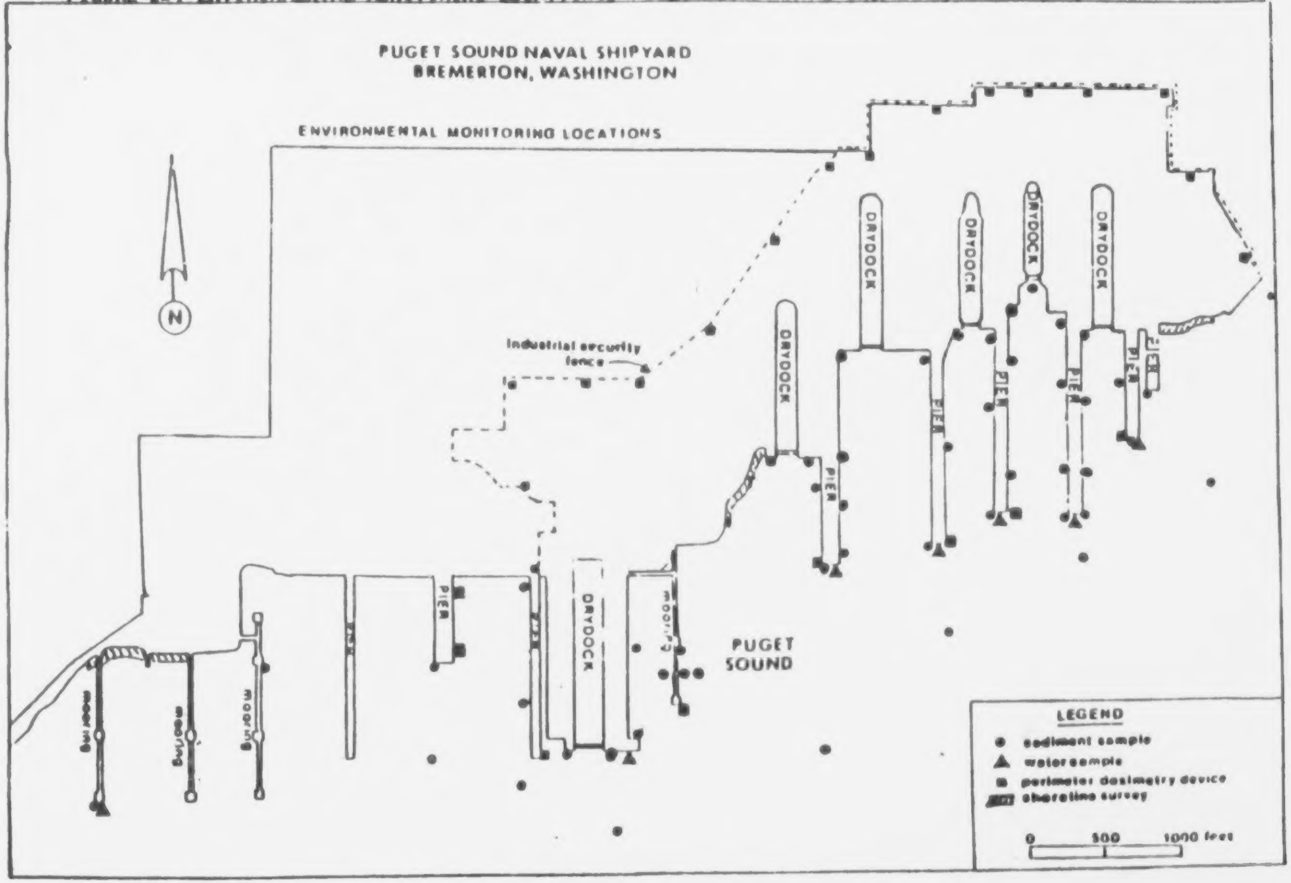

HAMPTON ROADS HARBOR
Pier 20
Pier 21
Pier 22
Pier 23
Pier 24
Pier 25
Pier 2
Pier 3
Pier 4
Pier 5
Pier 7
Pier 10
Pier 11
Pier 12
MUNICIPAL TERMINALS
Hampton Blvd
Adm Taussig Blvd
N
scale in feet
600 0 600 1200 2000
LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
■ PERIMETER DOSIMETRY DEVICE

FIGURE 21

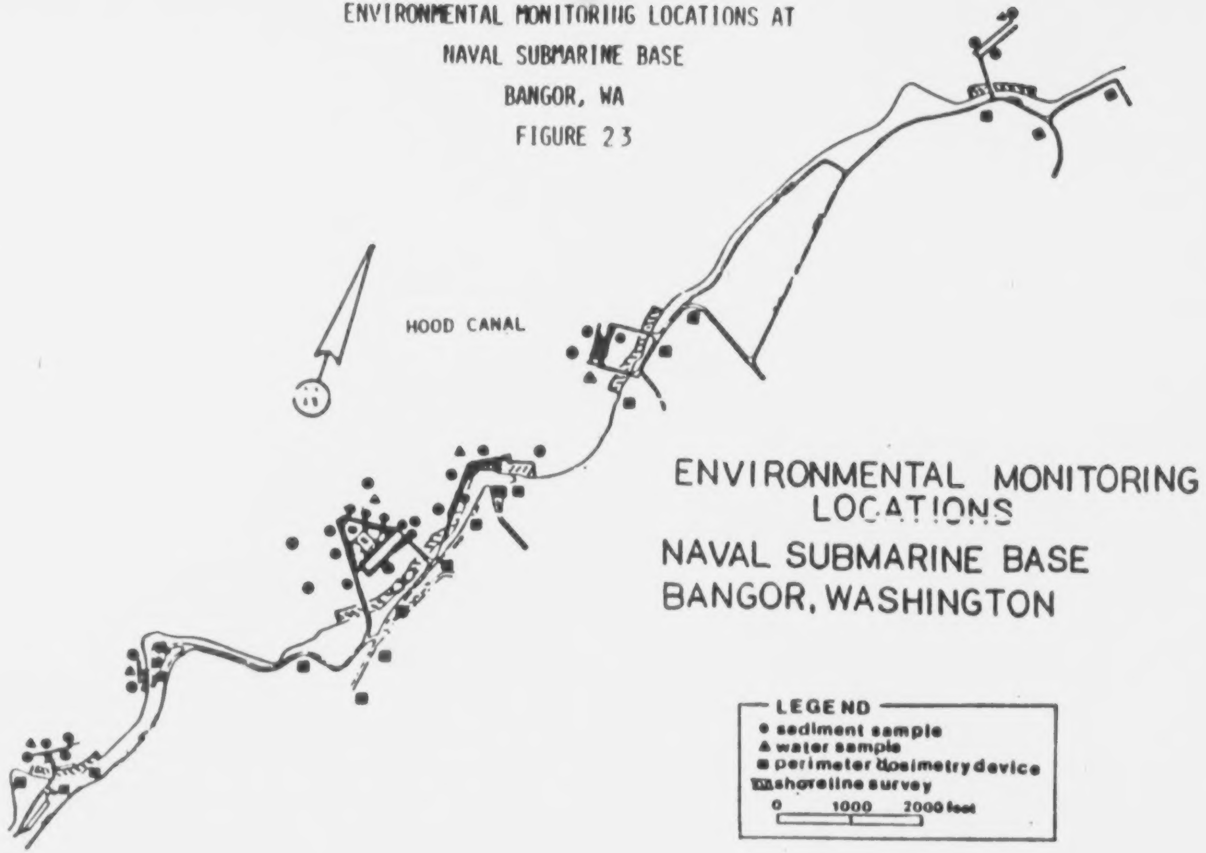

FORT MONROE
NEWPORT NEWS
CHESAPEAKE BAY
LEGEND
SHORELINE SURVEY
HAMPTON ROADS
Destroyer & submarine Piers
NAVAL STATION NORFOLK
PUBLIC HEALTH HOSPITAL
ATLANTIC OCEAN
CRANEY ISLAND FUEL DEPOT
ELIZABETH RIVER
NORFOLK
N
VIRGINIA BEACH
NAVAL HOSPITAL
PORTSMOUTH
NORFOLK NAVAL SHIPYARD
ST JULIEN CREEK Annex
0 1 2 3
miles

SHORELINE RADIATION SURVEY LOCATIONS

FIGURE 22. ENVIRONMENTAL MONITORING LOCATIONS, PUGET SOUND NAVAL SHIPYARD, BREMERTON, WA


PUGET SOUND NAVAL SHIPYARD
BREMERTON, WASHINGTON
ENVIRONMENTAL MONITORING LOCATIONS
N
Industrial security fence
DRYDOCK
PIER
mooring
PUGET SOUND
LEGEND
● sediment sample
▲ watersample
■ perimeter dosimetry device
▨ shoreline survey
0
500
1000 feet

ENVIRONMENTAL MONITORING LOCATIONS AT
NAVAL SUBMARINE BASE
BANGOR, WA
FIGURE 23


HOOD CANAL
ENVIRONMENTAL MONITORING LOCATIONS
NAVAL SUBMARINE BASE
BANGOR, WASHINGTON
LEGEND
● sediment sample
▲ water sample
■ perimeter dosimetry device
▨ shoreline survey
0
1000
2000 feet

REPORT NT-90-2
FEBRUARY 1990

OCCUPATIONAL RADIATION EXPOSURE FROM U.S. NAVAL NUCLEAR PLANTS AND THEIR SUPPORT FACILITIES

NAVAL NUCLEAR PROPULSION PROGRAM
DEPARTMENT OF THE NAVY
WASHINGTON, D.C. 20362

Report NT-90-2
February 1990

OCCUPATIONAL RADIATION EXPOSURE
FROM U. S. NAVAL NUCLEAR PROPULSION PLANTS
AND THEIR SUPPORT FACILITIES

1989

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SUMMARY

Radiation exposures to Navy and civilian personnel monitored for radiation associated with U.S. Naval nuclear propulsion plants are summarized in this report. Navy personnel manned eighteen tenders, four submarine bases, 132 nuclear-powered submarines and fifteen nuclear-powered surface ships which were in operation at the end of 1989. Eight shipyards were engaged in construction, overhaul or refueling of these ships. The benefits of nuclear propulsion in our most capable combatant ships have long been recognized, and our nuclear-powered ballistic missile submarines form the most invulnerable element of the United States strategic deterrent.

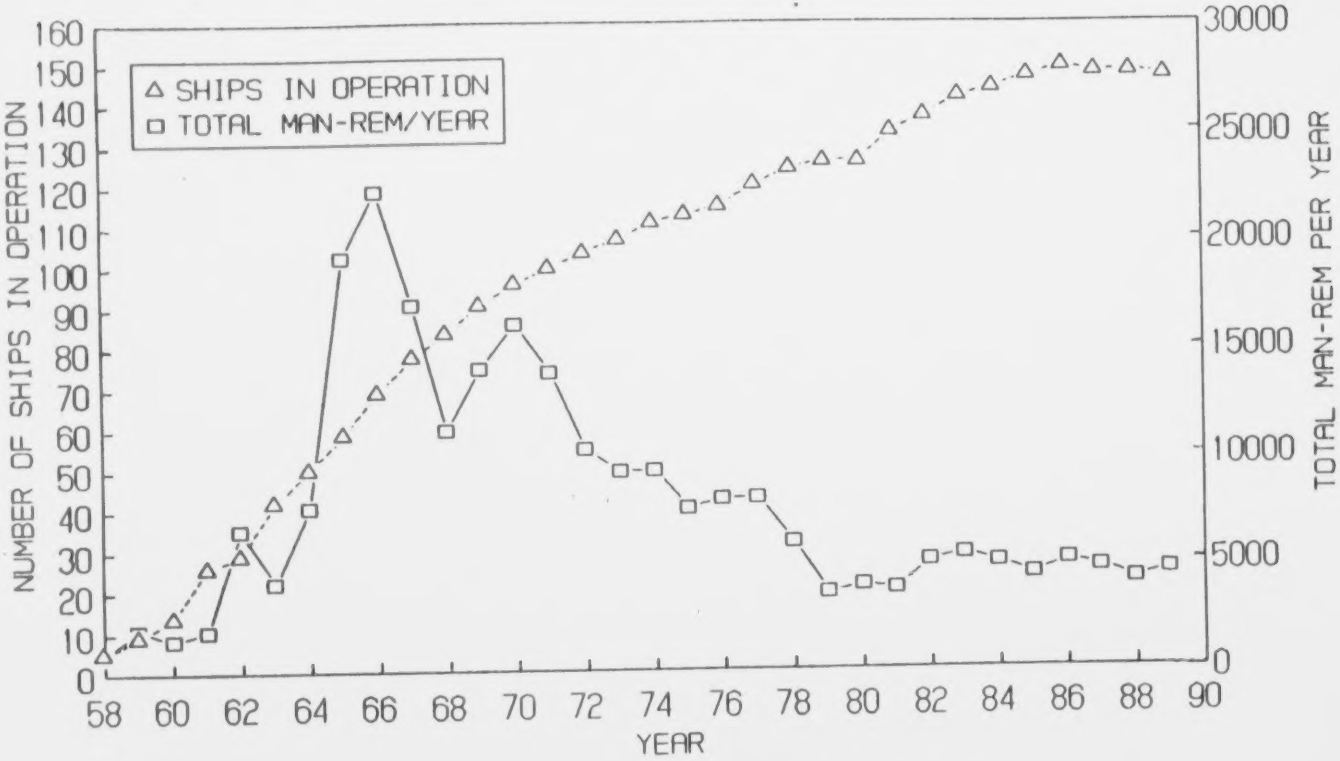
Figure 1 shows that the total radiation exposure in 1989 is less than one-fourth of the amount in the peak year of 1966, even though the number of nuclear-powered ships has more than doubled and the number of ships in overhaul has quadrupled since then. Total man-rem in this figure is the sum of the annual exposures of each person monitored for radiation.

No civilian or military personnel in the Naval Nuclear Propulsion Program have ever exceeded the Federal limit which allows five rem exposure for each year of age beyond age eighteen. Since 1967 no person has exceeded the Federal limit which allows up to three rem per quarter year, nor in this period has anyone exceeded the Navy's self-imposed limit of 5 rem per year for radiation associated with Naval nuclear propulsion plants.

No civilian or military personnel in the Naval Nuclear Propulsion Program have ever received more than one tenth the Federal annual occupational exposure limit from internal radiation exposure caused by radioactivity associated with Naval nuclear propulsion plants.

The average occupational exposure of each person monitored is less than one fifth of a rem per year. The total lifetime exposure from radiation associated with Naval nuclear propulsion plants to date for all personnel monitored since 1954 has averaged about one rem per person.

According to the standard methods for estimating risk, the risk to the group of personnel occupationally exposed to radiation associated with Naval nuclear propulsion plants is less than the risk these same personnel have from exposure to natural background radiation or to medical radiation. This risk is small compared to the risks accepted in normal industrial activities, and it is small compared to the risks regularly accepted in daily life outside work.



TOTAL RADIATION EXPOSURE RECEIVED BY
MILITARY AND CIVILIAN PERSONNEL IN THE NAVAL
NUCLEAR PROPULSION PROGRAM 1958-1989
FIGURE 1

EXTERNAL RADIATION EXPOSURE

Policy and Limits

The policy of the U. S. Navy is to reduce as low as reasonably achievable, exposure to personnel from ionizing radiation associated with Naval nuclear propulsion plants.

The radiation exposure limits used in the U. S. and abroad for whole body radiation exposure are 3 rem per quarter year and 5 rem accumulated dose for each year beyond age eighteen. These limits were recommended in 1958 by the U. S. National Committee ("Committee" was changed to "Council" when the organization was chartered by the U. S. Congress in 1964) on Radiation Protection and Measurements (ref 1) and by the International Commission on Radiological Protection (ref 2). They were adopted by the U. S. Atomic Energy Commission (AEC) and applied both within the AEC and to licensees in 1959 (ref 3). The U. S. Federal Radiation Council recommendation that these be used as guidance for Federal agencies was approved by President Eisenhower May 13, 1960 (ref 4). The U. S. Department of Labor adopted these same limits. A key part of each of these standards has been emphasis on minimizing radiation exposure to personnel.

In 1965 the International Commission on Radiological Protection (ref 5) reiterated the quarterly and accumulated limits cited above but suggested that exceeding 5 rem in one year should be infrequent. Although none of the other organizations referred to above changed its recommendations accordingly, the Naval Nuclear Propulsion Program adopted 5 rem per year as a rigorous limit effective in 1967.

In 1971 the National Council on Radiation Protection and Measurements (ref 6) recommended that 5 rem be adopted as the annual limit under most conditions. In 1974 the Atomic Energy Commission (now Department of Energy) (ref 7) established 5 rem as its annual limit. In 1977 the International Commission on Radiological Protection (ref 8) deleted the accumulated limit and recommended 5 rem as the annual limit. In 1979, the Nuclear Regulatory Commission issued a proposed change to the Code of Federal Regulations Title 10, Part 20 to require its licensees to use 5 rem as an annual limit. On January 20, 1987, revised guidance for Federal agencies was approved by President Reagan which eliminated the accumulated yearly dose limit discussed above and established a 5 rem per year limit for occupational exposure to radiation (ref 9).

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References are listed on pages 50 through 52.

The Navy limits for the nuclear propulsion program since 1967 have been:

3 rem per quarter year
5 rem per year

Special limits are in effect such as for hands and feet; however, there have been few cases where these limits have been more restrictive than the whole body radiation exposure limits. Therefore, the radiation exposures discussed in this report are nearly all from whole body radiation. Controls are also in effect to minimize any occupational radiation exposure to the unborn child of a pregnant worker.

Each organization in the Naval Nuclear Propulsion Program is required to have an active program to reduce radiation exposure to the minimum practicable.

Source of Radiation

The radiation discussed in this report originates from pressurized water reactors. Water circulates through a closed piping system to transfer heat from the reactor core to a secondary steam system isolated from the reactor cooling water. Trace amounts of corrosion and wear products are carried by reactor coolant from reactor plant metal surfaces. Some of these corrosion and wear products are deposited on the reactor core and become radioactive from exposure to neutrons. Reactor coolant carries some of these radioactive products through the piping systems where a portion of the radioactivity is removed by a purification system. Most of the remaining radionuclides transported from the reactor core deposit in the piping systems.

The reactor core is installed in a heavy-walled pressure vessel within a primary shield. This shield limits radiation exposure from the gammas and neutrons produced when the reactor is at power. Reactor plant piping systems are installed primarily inside a reactor compartment which is surrounded by a secondary shield. Access to the reactor compartment is permitted only after the reactor is shut down. Most radiation exposure to personnel comes from inspection, maintenance and repair inside the reactor compartment. The major source of this radiation is cobalt 60 deposited inside the piping systems. Cobalt 60 emits two high energy gammas and a low energy beta for every radioactive decay. Its half-life is 5.3 years.

Neutrons produced when reactor fuel fissions are shielded by both primary and secondary shields before penetrating to occupied areas. Radiation exposure to personnel from these neutrons during reactor operation has been much less than from gammas. After reactor shutdown, when shipyard and other support facility work is done, no neutron exposure is detectable. As a result, the radiation exposures discussed in this report are nearly all from gamma radiation.

Control of Radiation During Reactor Plant Operation

Reactor plant shielding is designed to minimize radiation exposure to personnel. Shield design criteria establishing radiation levels in various parts of each nuclear-powered ship are personally approved by the Director of the Naval Nuclear Propulsion Program.

Ship design is also controlled to keep locations, such as duty stations where personnel need to spend time, as far as practicable away from the reactor compartment shield. Special attention is paid to living quarters. For example, the shield design criteria were established such that a person would have to spend more than 48 hours per day in living quarters to exceed exposure limits (which is impossible since there are only 24 hours in a day).

Resulting radiation exposure to those aboard ship outside propulsion plant spaces during reactor plant operation is not any greater than natural background radiation. For submarine operating personnel outside the propulsion plant, the combination of low natural radioactivity in ship construction materials and reduced cosmic radiation under water results in less radiation exposure from the nuclear reactor at sea than the public receives from natural background sources ashore. Those who operate the nuclear propulsion plant receive more radiation exposure in port during maintenance and overhaul periods than they receive from operating the propulsion plant at sea.

Control of Radiation in Support Facilities

Tenders for nuclear-powered submarines and surface ships are designed so that radioactive material is handled only in specially designed and shielded nuclear support facilities. Submarine bases and shipyards limit to the minimum, the number of places where radioactive material is allowed. Specific traffic routes are required to be used for any movement of radioactive material outside these nuclear support facilities. A radioactive material accountability system is used to ensure no radioactive material is lost or misplaced in a location where personnel could unknowingly be exposed. Regular inventories are required for every item in the radioactive material accountability system. Radioactive material is tagged with yellow and magenta tags bearing the standard radiation symbol and the measured radiation level. Radioactive material removed from a reactor plant is required to be placed in yellow plastic, and the use of yellow plastic is reserved solely for radioactive material. All personnel assigned to a tender, submarine base or shipyard are trained to recognize that yellow plastic identifies radioactive material and to initiate immediate action if radioactive material is discovered out of place.

Access to radiation areas is controlled by radiological control personnel. Personnel are required to wear dosimetry devices to enter these areas. Dosimetry devices are also posted on the boundaries of these areas to verify that personnel outside these areas do not require monitoring. Frequent radiation surveys are required using instruments which are checked before use and calibrated regularly. Areas where radiation levels are greater than 0.1 rem per hour are called high radiation areas and are locked or guarded.

Dosimetry

Thermoluminescent dosimeters (TLD's) are the dosimetry devices worn by personnel to measure their exposure to gamma radiation. The thermoluminescent dosimeter contains two chips of calcium fluoride with added manganese. It is characteristic of thermoluminescent material that radiation causes internal changes which make the material, when subsequently heated, give off an amount of light directly proportional to the radiation dose. In order to make it convenient to handle, these chips of calcium fluoride are in contact with a metallic heating strip with heater wires extending through the ends of a surrounding glass envelope. The glass bulb is protected by a plastic case designed to permit the proper response to gammas of various energies. Gammas of such low energy that they will not penetrate the plastic case constitute less than a few percent of the total gamma radiation present. To read the radiation exposure, a trained operator removes the glass bulb and places it in a TLD reader so that the metal heater wires contact an electrical circuit. An electronically controlled device heats the calcium fluoride chips to several hundred degrees centigrade in a timed cycle, and the intensity of light emitted is measured and converted to a digital readout in units of rem. The heating cycle also anneals the calcium fluoride chips so that the dosimeter is zeroed and ready for subsequent use. The entire cycle of reading a TLD described here takes about thirty seconds. This rapid readout capability was one reason for changing from film badges to TLD's. The use of TLD's permits more frequent measurement of a worker's radiation exposure than film badges. TLD's are required to be processed at least daily in Naval shipyards. Aboard ship, TLD's are required to be processed at least monthly except that daily processing is required for anyone entering a reactor compartment or high radiation area.

To ensure accuracy of the TLD system, several periodic calibration and accuracy checks are performed. For example, TLD's are checked when new and once every six months thereafter for accurate response to a known radiation exposure. Those that fail are discarded or repaired. TLD readers are calibrated once each year to verify accuracy by one of several calibration facilities having precision radiation sources and precision TLD standards. In addition, weekly, daily and hourly checks of proper TLD reader operation and accuracy are performed when readers are in use utilizing internal electronic standards built into each reader.

In addition to these calibrations and checks, the Navy has an independent dosimetry quality assurance program to monitor the accuracy of TLD's and TLD readers in use at program activities. Precision TLD's are pre-exposed to exact amounts of radiation by the National Institute of Standards and Technology, formerly the National Bureau of Standards, and provided to program activities for reading. The activity's results are then compared to the actual exposures. A random sample of dosimeters in use at the activity being tested is also selected and sent to a Navy shore facility for accuracy testing. To assure objectivity, the activity being tested is not told of the radiation values to which the dosimeters have been exposed and is not permitted to participate in the selection of the dosimeter sample. Any inaccuracies found by these tests that exceed established permissible error bands result in appropriate corrective action such as recalibration of a failed TLD reader. The results of this program demonstrate that the radiation to which personnel are exposed is being measured by the TLD system with an average error of less than 10%.

In 1988, the Navy dosimetry system was accredited for two years under the National Voluntary Laboratory Accreditation Program. This voluntary program, sponsored by the National Institute of Standards and Technology, provides independent review of dosimetry services for consistency with accepted standards.

Pocket ionization chambers with an eyepiece permit the wearer to read his own radiation exposure. This pocket dosimeter is required in addition to a TLD when entering a reactor compartment or a high radiation area. Pocket dosimeters are used to enable the wearer to keep track of his own radiation exposure during a work period. The official record of radiation exposure is obtained from the TLD.

Dosimetry devices are worn on the trunk of the body, normally at the waist or chest. In some special situations dosimeters are worn at other locations, for example on the hands or fingers or head.

In 1974, the conversion from film badges to TLD's for measuring radiation exposure was completed. Prior to this time film packets like those used for dental X-ray were placed in holders designed to allow differentiating between types of radiation. The darkness of the processed film was measured with a densitometer and converted to units of radiation exposure. When the first personnel radiation exposures were measured in the Naval Nuclear Propulsion Program, there already was widespread photodosimetry experience in the Navy and precise procedures existed to provide reproducible results.

Each film badge was clearly marked with a name or number corresponding to the individual to whom it was assigned. This number was periodically checked by a radiological control technician before a worker entered a high radiation area. In high radiation areas every worker also wore a pocket dosimeter which was read by radiological control personnel when the worker left the area. At the end of each month when the film badges were processed, the film badge measurements were compared with the sum of the pocket dosimeter readings. The film badge results were, with few exceptions, entered in the permanent personnel radiation exposure records.

Discrepancies between film badge and pocket dosimeter measurements were investigated. These investigations included making independent estimates of the worker's exposure using such methods as time spent in the specific radiation area and comparing the estimates with the two measurements to determine which measurement was in error. If the error could not be determined, then the higher exposure was recorded for the worker. In nearly all cases, this was the film badge measurement.

Results of numerous tests conducted by shipyards under the same conditions that most radiation exposure was received showed that film measurements averaged fifteen percent higher than actual radiation exposures. This was a conscious conservatism to ensure that under the worst case, the film measurement was not less than the actual radiation exposure. Film response varies with the energy of the gamma radiation. The calibration of the film was performed at high energy where the film has the least response to radiation exposure. Radiation of lower energies corresponding to scattered radiation from shielded cobalt 60 causes the film to indicate more radiation exposure than is present.

Data gathered in over 20 years of neutron monitoring aboard ships using neutron film badges demonstrated that the monitored individuals did not receive neutron exposure above the minimum detection level for neutron film. Naval nuclear-powered ships and their support facilities now use lithium fluoride TLD's to monitor neutron exposure of the few personnel exposed to neutron sources such as for radiation instrument calibration and for reactor plant instrumentation source handling. These measured neutron exposures have been added to gamma exposures in the total whole body radiation exposure in this report, but because neutron exposures are so low, the radiation exposures in this report are nearly all from gamma radiation.

Monitoring for beta radiation is not normally required because betas cannot penetrate the metal boundaries of the reactor coolant system. Beta radiation needs to be considered in maintenance or repair operations only when systems are opened so that personnel are close to surfaces which have been contaminated with radioactive corrosion products from reactor coolant. In these cases normal clothing or eyeglasses or plastic contamination control materials completely shield beta radiation of the energies normally present. Support facilities routinely provide such shielding to eliminate personnel radiation exposure from betas.

Monitoring for alpha radiation is not a normal part of operation or maintenance of Naval nuclear propulsion plants. However, alpha monitoring is sometimes necessary to identify radon daughter products naturally present in the atmosphere.

Physical Examinations

Radiation medical examinations have been required since the beginning of the Naval Nuclear Propulsion Program for personnel exposed to radiation. These examinations are conducted in accordance with the Navy's Radiation Health Protection Manual (ref 10). In these examinations the doctor pays special attention to any condition which might indicate that radiation exposure would cause an increased degree of risk. Passing this examination is a prerequisite for obtaining dosimetry which permits entry to areas where radiation exposure can be received. For military personnel who have already been screened by physical examinations, few fail this radiation medical examination. For civilian shipyard workers, the failure rate is a few percent. However, failure of this examination does not mean a shipyard worker will not have a job. Since shipyard workers spend most of their time on non-radioactive work, inability to qualify for radioactive work does not restrict their job opportunities. No shipyard worker in the Naval Nuclear Propulsion Program has been fired for inability to pass a radiation medical examination.

Radiation medical examinations are given prior to initial radiation work, periodically thereafter (at least every three years), and at termination of radioactive work in the nuclear propulsion program (or at termination of employment).

A radiation medical examination includes review of medical history to determine, among other subjects, past radiation exposure, history of cancer, history of radiation therapy, and family history of cancer. In the medical examination particular attention is paid to evidence of cancer. Laboratory procedures include urinalysis, blood analysis, and comparison of blood constituents to a specific set of standards. Chest X-rays with full size film to reduce radiation exposure were also a routine part of all radiation medical examinations until 1977. At that time routine chest X-rays were discontinued, further reducing radiation exposure of workers. Chest X-rays are now performed when clinically indicated at the discretion of the medical officer. In the event disqualifying conditions are found in an examination of Naval civilian or military personnel, the individual is barred from receiving occupational radiation exposure and the results of the examination are reviewed by the Naval Medical Command Radiation Effects Advisory Board. Only after approval of the Board would the individual be permitted to receive occupational radiation exposure.

Shipyard, Tender, and Submarine Base Training

Periodic radiological control training is performed to ensure each person understands the general and specific radiological aspects which he might encounter, understands his responsibility to the Navy and the public for safe handling of radioactive materials, understands the risks associated with radiation exposure and understands his responsibility to minimize his own radiation exposure. Training is also provided on the biological risk of radiation exposure to the unborn child. Prior to being authorized to perform radioactive work, an employee is required to complete satisfactorily a radiological control training course, including a written examination. Typical course lengths for workers range from 16 to 32 hours. In written examinations on radiological controls, short answer questions, such as multiple choice and true-false questions, are not normally used. The following are the minimum training requirements for workers:

1. Radiation Exposure Control

    a. State the limits for whole body penetrating radiation. Explain that the rem is a unit of biological dose from radiation.

    b. Explain how "stay times" are used.

    c. Be aware of the seriousness of violating instructions on radiation warning signs and unauthorized passage through barriers.

    d. Discuss procedures and methods for minimizing exposure such as working at a distance from a source, reducing time in a radiation area, and shielding.

    e. Discuss potential sources of radiation associated with work performed by the individual's trade.

    f. State where dosimetry equipment shall be placed o an individual's body.

    g. Demonstrate ability to read all types of dosimeters in use.

    h. Discuss importance of the individual keeping trac of his or her own exposure.

i. Be aware of the significance of personnel radiation exposure. The National Council on Radiation Protection and Measurements has stated that while exposures of workers and the general population should be kept to the lowest practicable level at all times, the presently permitted exposures represent a level of risk small compared with other hazards of life. The Nuclear Regulatory Commission has stated, "Control of exposure to radiation is based on the assumption that any exposure, no matter how small, involves some risk." The risk of injury from radiation associated with Naval nuclear propulsion plants is low compared to the occupational and nonoccupational risks accepted in everyday life.

2. Contamination Control

a. Discuss how contamination is controlled during radioactive work (e.g., containment in plastic bags and use of contamination containment areas).

b. Discuss procedures for preventing contamination of personnel and how contamination is detected on personnel.

c. Discuss how contamination is removed from contaminated objects and personnel.

d. Discuss potential sources of contamination associated with work performed by the individual's trade.

e. State the beta-gamma surface contamination limit. Discuss the meaning of the units of the limit.

f. Demonstrate proper procedure for donning and removing a full set of anticontamination clothing.

g. Demonstrate proper procedures for entering and leaving a contaminated area including proper procedures for self-monitoring.

h. Explain what radioactive contamination is. Explain the difference between radiation and radioactive contamination.

i. For personnel required to work in containment areas (e.g., glove bags or tents), demonstrate proper procedures for working in these areas. (This ability is often demonstrated on a mock-up.)

j. For personnel who are likely to encounter airborne radioactivity, demonstrate the proper procedure for donning and removing the type of respiratory equipment the individual will be required to wear. For personnel who are required to wear respiratory equipment with anticontamination clothing, this demonstration shall be performed when donning and removing anticontamination clothing. The demonstration shall include any leak checks required to be made to test for proper operation of respiratory equipment.

k. For personnel who are likely to encounter airborne radioactivity, state the conditions which require wearing masks, air supplied respirators, or air supplied hoods.

3. Accountability of Radioactive Materials - Know that radioactive materials are accounted for when transferred between radiologically controlled areas by tagging, by recording disposition of material, and by specific authorization of radiological control personnel.

4. Waste Disposal - Discuss how individual workers can reduce the amount of radioactive liquid and solid waste.

5. Radiological Incidents

   a. Discuss the need for consulting radiological control personnel when questions or incidents occur.

   b. Discuss procedures to be followed after a spill of material (liquid or solid) which is or might be radioactive.

   c. Discuss procedures to be followed when notified that airborne radioactivity is above the limit.

   d. Demonstrate the action to be taken in event of a spill of radioactive liquid. This ability shall be demonstrated during a drill.

   e. Discuss the action to be taken when an individual discovers his dosimeter is off-scale.

6. Responsibilities of Individuals - Discuss actions required in order to fulfill workers' responsibilities. Include the responsibility of the individual to inform his employer of previous or concurrent occupational radiation exposure received.

In addition to passing a written examination, completion of this training course requires satisfactory performance during basic types of simulated work operations. For an employee to continue as a radiation worker, he has to requalify in a manner similar to the initial qualification at least every two years. In between these qualification periods, personnel are required to be selected at random for additional written and practical work operation examinations to determine how well the knowledge and abilities have been retained. Training is also conducted by individual shop instructors in the specific job skills for radiation work within each trade. For complex jobs this is followed by special training for the specific job, frequently using mock-ups outside radiation areas.

Radiological control technicians are required to complete a course of six months to one year in length in radiological controls, to demonstrate their practical abilities in work operations and drills and to pass comprehensive written and oral examinations. Radiological control supervisors are required to have at least the same technical knowledge and abilities as the technicians; however, passing scores for supervisors' examinations are higher or supervisors' examinations are more difficult than for technicians. Oral examinations are conducted by senior radiological control managers and require personnel to be able to evaluate symptoms of unusual radiological control situations. The radiological control technician or supervisor is required to evaluate initial symptoms, state immediate corrective action required, state what additional measurements are required, and do a final analysis of the measurements to identify the specific problem. Subsequent to qualification, periodic training sessions are required in which each radiological control technician and supervisor demonstrates ability to handle situations such as are used in the oral examinations. At least every two and a half years, radiological control personnel have to requalify through written and oral examinations similar to those used for initial qualification. Radiological control technicians and supervisors are required to demonstrate their practical abilities frequently through unannounced drills.

In addition to the above training for those who are involved in radioactive work, each shipyard employee not involved in radioactive work and each person assigned to a nuclear-powered ship or a support facility is required to receive basic radiological training which is repeated at least annually. This training is to ensure personnel understand the posting of radiation areas, the identification of radioactive materials, and not to cross radiation barriers. This instruction also explains that the radiation environment of personnel outside radiation areas and outside the ship or shipyard is not significantly affected by nuclear propulsion plant work.

Nuclear Power Training

Military personnel who operate Naval nuclear propulsion plants are required to pass a six month basic training course at nuclear power school and a six month qualification course at a land-based prototype of a shipboard reactor plant. Each nuclear-trained officer and enlisted man receives extensive radiological control training including lectures, demonstrations, practical work, radiological control drills and written and oral examinations. This training has emphasized the ability to apply basic information on radiation and radioactivity.

Those enlisted personnel who will have additional responsibilities for radiological control associated with operation of nuclear propulsion plants are designated Engineering Laboratory Technicians and receive an additional three months training after completion of the one year program. Engineering Laboratory Technicians and other selected nuclear trained personnel who are assigned radiological control duties at tenders and submarine bases normally receive an additional intensive one month training program in the practical aspects of radiological controls associated with maintenance and repair work.

Prior to becoming qualified as the Engineer Officer, that is, the head of the engineering department of a nuclear-powered ship, a nuclear-trained officer must pass a one day written examination and a sequence of oral examinations conducted at the Naval Nuclear Propulsion Program headquarters. A key part of these qualification examinations is radiological controls.

Immediately before serving as Commanding Officer of a nuclear-powered ship, an officer attends a three month course at the Naval Nuclear Propulsion Program headquarters. The radiological controls portion of this is an advanced course and assumes the officer starts with detailed familiarity with shipboard radiological controls. The officer must pass both written and oral examinations in radiological controls during this course prior to assuming command of a nuclear-powered ship.

Radiation Exposure Reduction

Maintaining personnel radiation exposures as low as reasonably achievable involves all levels of management in nuclear-powered ships and their support facilities. Operations, maintenance and repair personnel are required to be involved in this subject; it is not left solely to radiological control personnel. To evaluate the effectiveness of radiation exposure reduction programs, managers use a set of goals. Goals are also set in advance to keep each worker's exposure under certain levels and to minimize the number of workers involved. Goals are also set on the total cumulative personnel radiation exposure (man-rem) for each major job, for the entire overhaul or maintenance period, and for the whole year. These goals are deliberately made hard to meet in order to encourage personnel to improve performance.

Of the various goals used, the most effective in reducing personnel radiation exposure has been the use of exposure control levels which are lower than the Navy's quarterly and annual limits. Control levels in shipyards range from 0.5 rem to 2 rem for the year, depending on the amount of radioactive work scheduled, whereas 5 rem per year is the annual Navy limit.

To achieve the benefits of lower control levels in reducing total man-rem, it is essential to minimize the number of workers permitted to receive radiation exposure. Otherwise the control levels could be met merely by adding more workers. Organizations are required to conduct periodic reviews to ensure the number of workers is the minimum for the work that has to be performed.

The following is a synopsis of the checklist which has been in use for years in maintaining personnel radiation exposure as low as reasonably achievable during maintenance, overhaul, and repair.

Preliminary Planning

- Plan in advance
- Delete unnecessary work
- Determine expected radiation levels

Preparation of Work Procedures

- Plan access to and exit from work area
- Provide for service lines (air, welding, ventilation, etc.)
- Provide communication (sometimes includes closed-circuit television)
- Remove sources of radiation
- Plan for installation of temporary shielding
- Decontaminate
- Work in lowest radiation levels
- Perform as mucn work as practicable outside radiation areas
- State requirements for standard tools
- Consider special tools
- Include inspection requirements (these identify steps where radiological control personnel must sign prior to work proceeding)
- Minimize discomfort of workers
- Estimate man-rem

Temporary Shielding

- Control installation and removal by written procedure
- Inspect after installation
- Conduct periodic radiation surveys
- Minimize damage caused by heavy lead temporary shielding
- Balance radiation exposure received in installation against exposure to be saved by installation
- Shield travel routes
- Shield components with abnormally high radiation levels early in the maintenance period
- Shield position worker occupies
- Perform directional surveys to improve design of shielding by locating sources of radiation
- Use mock-up to plan temporary shielding design and installation

Rehearsing and Briefing

- Rehearse
- Use mock-up duplicating working conditions
- Use photographs
- Brief workers

Performing Work

- Post radiation levels
- Keep excess personnel out of radiation areas
- Minimize beta radiation exposure (anticontamination clothing effectively shields cobalt 60 betas)
- Supervisors and workers keep track of radiation exposure
- Workers assist in radiation and radioactivity measurements
- Delegate radiological control monitoring responsibilities when necessary to minimize radiation exposure
- Evaluate use of fewer workers
- Reevaluate reducing radiation exposures

Additional measures that have been taken to reduce exposure include standardization of procedures, development of new tooling, improved use of temporary shielding, and compliance with strict contamination control measures. For example, most work involving radioactive contamination is performed in total containment. This practice minimizes the potential for spreading contamination and thus reduces work disruptions, simplifies working conditions and minimizes the cost and exposure to clean up.

Lessons learned during radioactive work and new ways to reduce exposure developed at one organization are made available for use by other organizations in the Naval Nuclear Propulsion Program. This effort allows all of the organizations to take advantage of the experience and developments at one organization and minimizes redundant effort.

The extensive efforts that have been taken to reduce exposure in the Naval Nuclear Propulsion Program have also had unplanned benefits, such as reduced cost to perform radioactive work and improved reliability. Efforts such as detailed work planning, rehearsing, total containment, special tools and standardization have resulted in increased efficiency and better access to perform maintenance with the overall result that reliability is improved and costs are reduced.

Radiation Exposure Data

Radioactive materials had been handled in shipyards for years before Naval nuclear propulsion plant work started. Examples of such work include non-destructive testing using radiography sources and radiation instrument calibration using radioactive sources. Since this work is licensed by the Nuclear Regulatory Commission or by a state under agreement with the Nuclear Regulatory Commission, the radiation exposure from this licensed work has been excluded whenever practicable from this report.

Table 1 shows the dates when radioactive work associated with Naval nuclear propulsion plants started in each of eleven shipyards. Seven of these shipyards have constructed Naval nuclear-powered ships; however, little radiation exposure is received in new construction. The dates of starting reactor plant overhaul, therefore, are the significant dates for start of radioactive work.

The total occupational radiation exposure received by all personnel in the Naval Nuclear Propulsion Program in 1989 was 4,528 man-rem. Table 2 summarizes radiation exposure received in nuclear-powered ships and their supporting tenders and submarine bases since the first nuclear-powered ship went to sea in January 1955. Most of the radiation exposure in this table results from inspection, maintenance and repair work in the reactor compartments of ships. In general, radiation exposures for reactor compartment work increase as reactor plant radiation levels increase with the age of the plant.

As expected, the number of personnel monitored for exposure to radiation increased with the increasing number of nuclear-powered ships. Initially, everyone aboard a nuclear-powered submarine was monitored for occupational radiation exposure.

After years of experience showed that personnel outside propulsion plant spaces received exposures indistinguishable from natural background, the number of personnel monitored for occupational exposure to radiation from the propulsion plant was sharply reduced in 1974. For example, in 1973 almost sixty percent of those monitored were recorded as receiving zero radiation exposure; as a result of reducing numbers of personnel monitored unnecessarily, less than ten percent of those monitored for occupational exposure are now recorded with zero exposure. Personnel outside propulsion plant spaces in submarines now wear dosimetry badges to verify they do not receive occupational exposure from the propulsion plant.

Table 3 summarizes radiation exposures of shipyard personnel since the start of Naval nuclear propulsion plant radioactive work in 1954. Figure 2 shows graphically that total personnel radiation exposure has been reduced in shipyards even though the amount of work has increased. Since ship overhauls frequently overlapped calendar years, the numbers of ships in overhaul shown in Figure 2 were determined by dividing by 12 the total number of months each ship was in overhaul during a calendar year.

The increase in the numbers of personnel monitored and total man-rem exposure in the early years shows the increasing workload in reactor plant work as the number of ships increased. By 1962 four submarine reactor plants had been overhauled and major efforts were underway to reduce radiation levels. By 1966 the number of ships in overhaul had quadrupled as indicated by the buildup to the peak in total man-rem. Subsequently, the number of ships in overhaul more than quadrupled again. Decreases in total annual exposures, numbers of personnel monitored, and numbers of personnel with annual exposures over 2 rem have been as a result of the program to reduce radiation exposures to the minimum practicable. Since 1954, the total annual exposure for the shipyards has averaged less than 5,100 man-rem and for ships has averaged less than 1,800 man-rem.

Since a worker usually is exposed to radiation in more than one year, the total number of personnel monitored cannot be obtained by adding the annual numbers. The total number of shipyard personnel monitored for radiation exposure associated with the Naval Nuclear Propulsion Program has been about 152,000. Nearly all of these are civilians, about half of whom are U. S. Government employees at six Naval shipyards. Table 4 provides further information about the distribution of their radiation exposures. In 1989, over 93 percent of those monitored for radiation in shipyards and more than 99 percent of those in ships received less than 0.5 rem in a year, the limit allowed by Federal regulations for a member of the general public. The average exposure per year for each person monitored has been 0.28 rem in shipyards, which is less than one tenth the occupational exposure limit. The average exposure per year for those monitored in ships has been 0.10 rem, which is less than the average annual exposure a person receives from natural background and medical radiation.

Table 4 also lists the numbers of personnel who have exceeded the 3 rem quarterly exposure limit. In no case have personnel exceeded the accumulated limit of 5 rem for each year of age over eighteen. The total number of persons who have exceeded the quarterly limit since the limit was imposed in 1959 is 37, of whom 4 were military personnel aboard ships. Thirty of the 37 personnel had quarterly exposures in the range of 3 to 4 rem, and the highest exposure was 9.7 rem in a quarter. Navy procedures require any person who receives greater than 25 rem in a short time period to be placed under medical observation. None of the exposures reached this level.

The average lifetime accumulated exposure from radiation associated with Naval nuclear plants for all shipyard personnel is 1.2 rem. Since the average annual exposure per person is 0.28 rem, this means that the average shipyard radiation worker is monitored because of Naval nuclear propulsion plant work for about four years. The average lifetime accumulated exposure for the 81,000 Naval officers and enlisted men trained to date to operate a nuclear propulsion plant is less than 0.8 rem. These radiation exposures are much less than the exposure the average American receives from medical diagnostic X-rays during his working lifetime.

TABLE 1

SHIPYARD FIRST REACTOR PLANT OPERATION AND FIRST RADIOACTIVE OVERHAUL WORK

Shipyard	Year First New Construction Reactor Started Operation	Year First Reactor Plant Overhaul Started
Electric Boat Division* Groton, Connecticut	1954	1957
Portsmouth Naval Shipyard Portsmouth, New Hampshire	1958	1959
Mare Island Naval Shipyard** Vallejo, California	1958	1962
Pearl Harbor Naval Shipyard Pearl Harbor, Hawaii	None	1962
Charleston Naval Shipyard** Charleston, South Carolina	None	1963
Newport News Shipbuilding Newport News, Virginia	1960	1964
Bethlehem Steel Shipbuilding*** (Subsequently Electric Boat Division) Quincy, Massachusetts	1961	None
New York Shipbuilding Corporation*** Camden, New Jersey	1963	None
Norfolk Naval Shipyard Portsmouth, Virginia	None	1965
Puget Sound Naval Shipyard** Bremerton, Washington	None	1967
Ingalls Shipbuilding Division*** Pascagoula, Mississippi	1961	1970

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* Electric Boat Division performed overhauls in 1957-1977 but only did new construction work again starting in 1978.

** Radioactive work of less extent than in an overhaul commenced in Mare Island in 1958, in Charleston in 1961, and in Puget Sound in 1965.

*** Work on Naval nuclear-powered ships was discontinued at Camden, New Jersey in 1967, at Quincy, Massachusetts in 1969, and at Pascagoula, Mississippi in 1980.

TABLE 2
OCCUPATIONAL RADIATION EXPOSURE RECEIVED BY PERSONNEL ASSIGNED TO TENDERS, BASES, AND NUCLEAR-POWERED SHIPS FROM OPERATION AND MAINTENANCE OF NAVAL NUCLEAR PROPULSION PLANTS

	Number of Persons Monitored Who Received Exposures in the Following Ranges of Rem for the Year						Total Personnel Monitored	Total Man-Rem
Year	0-1	1-2	2-3	3-4	4-5	>5*		
1954	36	0	0	0	0	0	36	8
1955	90	11	0	0	0	0	101	25
1956	108	10	4	0	0	0	122	50
1957	293	7	1	0	0	0	301	60
1958	562	11	3	0	0	0	576	100
1959	1,057	41	8	3	0	0	1,109	200
1960	2,607	88	8	4	3	1	2,711	375
1961	4,812	106	31	4	4	0	4,957	680
1962	6,788	182	75	31	17	1	7,094	1,312
1963	9,188	197	39	14	3	1	9,442	1,420
1964	10,317	331	93	35	15	4	10,795	1,964
1965	11,883	592	224	96	30	24	12,849	3,421
1966	18,118	541	156	95	44	28	18,982	3,529
1967	21,028	339	139	48	11	0	21,565	3,084
1968	24,200	373	103	20	2	0	24,698	2,463
1969	26,969	577	127	39	6	0	27,718	2,918
1970	26,206	610	134	30	0	0	26,980	3,089
1971	26,090	568	122	31	2	0	26,813	3,261
1972	33,312	602	180	13	1	0	34,108	3,271
1973	30,852	600	102	15	1	0	31,570	3,160
1974	18,375	307	65	2	0	0	18,749	2,142
1975	17,638	330	28	1	0	0	17,997	2,217
1976	17,795	369	56	9	0	0	18,229	2,642
1977	20,236	346	95	36	3	0	20,716	2,812
1978	22,089	290	23	1	0	0	22,403	2,234
1979	21,121	75	1	0	0	0	21,197	1,528
1980	21,767	78	0	0	0	0	21,845	1,494
1981	23,781	27	0	0	0	0	23,808	1,415
1982	27,563	59	0	0	0	0	27,622	1,660
1983	27,593	52	0	0	0	0	27,645	1,832
1984	30,096	10	0	0	0	0	30,106	1,729
1985	31,447	18	0	0	0	0	31,465	1,549
1986	33,944	16	0	0	0	0	33,960	1,593
1987	34,885	2	0	0	0	0	34,887	1,536
1988	34,373	4	0	0	0	0	34,377	1,421
1989	34,820	52	0	0	0	0	34,872	1,587

Note: Data obtained from summaries rather than directly from original medical records. Total man-rem was determined by adding actual exposures for each individual monitored by each reporting command during the year. Total number monitored includes visitors to each reporting command. It is expected that the large effort to compile comparable man-rem data from original medical records would show differences no greater than five percent.

* Limit in the Naval Nuclear Propulsion Program was changed to 5 rem per year in 1967

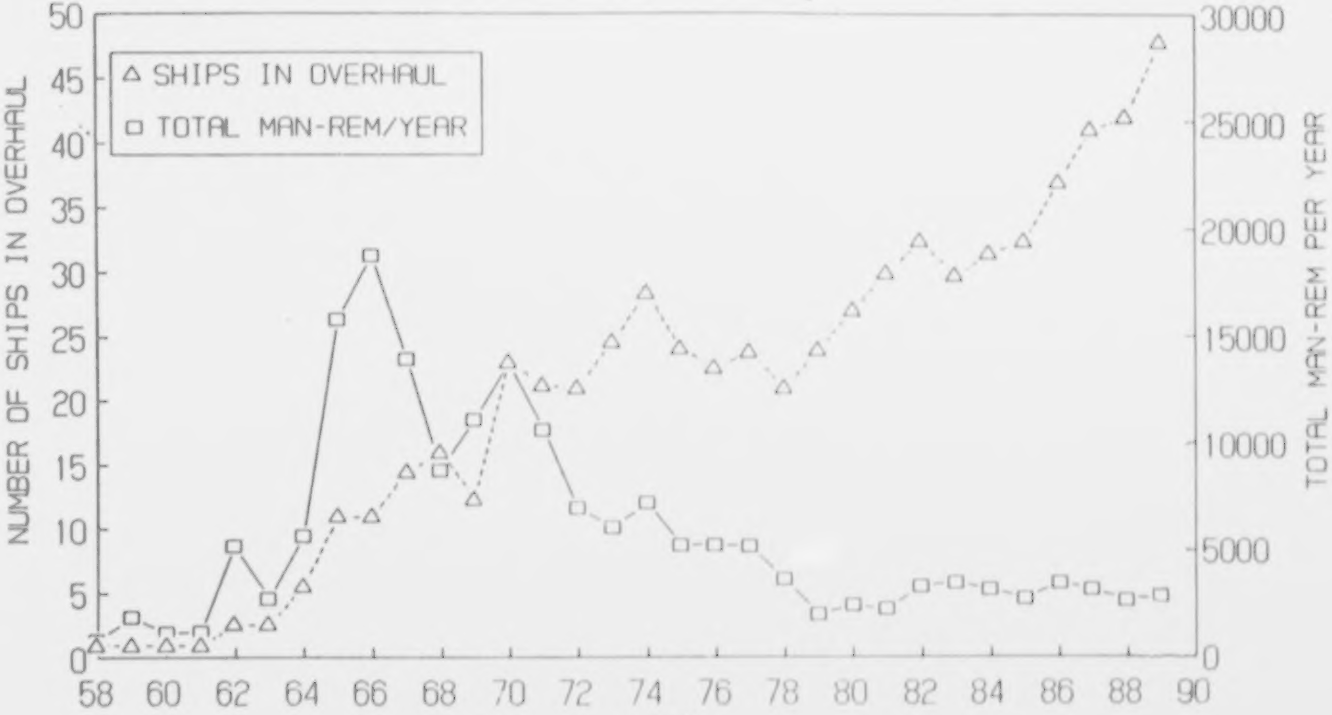
TABLE 3

OCCUPATIONAL RADIATION EXPOSURE RECEIVED BY SHIPYARD PERSONNEL FROM WORK ASSOCIATED WITH NAVAL NUCLEAR PROPULSION PLANTS

Year	Number of Persons Monitored Who Received Exposures in the Following Ranges of Rem for the Year						Total Personnel Monitored	Total Man-Rem
	0-1	1-2	2-3	3-4	4-5	>5*		
1954	508	9	3	5	3	0	528	64
1955	2,563	80	25	6	3	2	2,679	344
1956	2,834	20	5	2	0	1	2,862	162
1957	3,473	97	31	1	2	4	3,608	495
1958	5,766	165	46	10	4	7	5,998	779
1959	10,388	221	133	78	49	23	10,892	1,864
1960	12,047	198	97	22	4	0	12,368	1,158
1961	13,383	198	91	44	14	3	13,733	1,241
1962	14,411	642	366	247	146	108	15,920	5,222
1963	19,164	446	159	71	34	28	19,902	2,725
1964	24,044	804	445	215	144	41	25,693	5,678
1965	22,630	2,306	1314	814	618	525	28,207	15,829
1966	29,490	2,352	1,623	1,057	1,139	513	36,174	18,804
1967	29,853	2,388	1,563	1,096	733	1	35,634	13,908
1968	30,159	1,344	773	496	279	0	33,051	8,719
1969	25,672	1,790	1,080	753	375	0	29,670	11,077
1970	21,182	2,127	1,382	740	492	0	25,923	13,084
1971	20,041	1,928	1,066	650	240	0	23,925	10,616
1972	17,514	1,692	849	139	5	0	20,199	7,002
1973	13,036	1,403	604	203	6	0	15,252	6,083
1974	12,587	1,464	745	311	50	0	15,157	7,206
1975	12,825	1,116	598	82	42	0	14,663	5,285
1976	13,042	1,268	633	30	0	0	14,973	5,310
1977	13,835	1,277	586	25	0	0	15,723	5,199
1978	13,700	1,016	268	0	0	0	14,984	3,680
1979	15,032	227	7	0	0	0	15,266	2,024
1980	15,287	377	0	0	0	0	15,664	2,402
1981	17,414	304	0	0	0	0	17,718	2,310
1982	19,210	648	0	0	0	0	19,858	3,353
1983	20,407	714	0	0	0	0	21,121	3,506
1984	20,684	502	0	0	0	0	21,186	3,181
1985	20,940	412	0	0	0	0	21,352	2,796
1986	21,186	875	0	0	0	0	22,061	3,495
1987	21,404	788	0	0	0	0	22,192	3,187
1988	20,969	543	0	0	0	0	21,512	2,702
1989	23,789	633	0	0	0	0	24,422	2,941

NOTE: Data obtained from summaries rather than directly from original medical records. Total man-rem was determined by adding actual exposures for each individual monitored by each shipyard during the year. Total number monitored includes visitors to each shipyard. It is expected that the large effort to compile comparable man-rem data from original medical records would show differences no greater than five percent.

*Limit in the Naval Nuclear Propulsion Program was changed to 5 rem per year in 1967.



TOTAL RADIATION EXPOSURE RECEIVED BY
SHIPYARD PERSONNEL FROM WORK ON NAVAL
NUCLEAR PROPULSION PLANTS 1958-1989
FIGURE 2

TABLE 4
SHIPYARD AND FLEET DISTRIBUTION
OF PERSONNEL RADIATION EXPOSURE

Year	Average Rem Per Person Monitored		Percent of Personnel Monitored Who Received Greater Than 1 Rem		Number of Personnel Who Exceeded 3 Rem/Quarter
	Fleet	Shipyard	Fleet	Shipyard	
1954	.22	.12	0	3.8	0
1955	.25	.13	10.9	4.3	0
1956	.41	.06	11.5	1.0	0
1957	.20	.14	2.7	3.7	0
1958	.17	.13	2.4	3.9	0
1959	.18	.17	4.7	4.6	8
1960	.14	.09	7.5	2.6	0
1961	.14	.09	2.9	2.5	0
1962	.18	.33	4.3	9.5	9
1963	.15	.13	2.7	3.7	2
1964	.18	.22	4.4	6.4	4
1965	.27	.56	7.5	19.8	5
1966	.19	.52	4.6	18.5	6
1967	.14	.39	2.5	16.2	3
1968	.10	.26	2.0	8.8	0
1969	.11	.37	2.7	13.5	0
1970	.11	.50	2.9	18.3	0
1971	.12	.44	2.7	16.2	0
1972	.10	.35	2.3	13.3	0
1973	.10	.40	2.3	14.5	0
1974	.11	.48	2.0	17.0	0
1975	.12	.36	2.0	12.5	0
1976	.14	.35	2.4	12.9	0
1977	.14	.33	2.3	12.0	0
1978	.10	.24	1.4	8.5	0
1979	.07	.13	0.4	1.5	0
1980	.07	.15	0.4	2.4	0
1981	.06	.13	0.1	1.7	0
1982	.06	.17	0.2	3.3	0
1983	.07	.17	0.2	3.4	0
1984	.06	.15	0.0	2.4	0
1985	.05	.13	0.1	1.9	0
1986	.05	.16	0.0	4.0	0
1987	.04	.14	0.0	3.6	0
1988	.04	.13	0.0	2.5	0
1989	.05	.12	0.1	2.6	0
Average	.09	.28	1.5	9.0	
NAVYWIDE AVERAGE	0.18		5.2		

Table 5 provides information on the distribution of lifetime accumulated exposures for all personnel who were monitored in 1989 for radiation exposure associated with Naval nuclear propulsion plants. Federal radiation exposure limits allow accumulating 100 rem in twenty years of work, or 200 rem in forty years. The fact that no one shown in Table 5 comes close to having accumulated this much radiation exposure is the result of deliberate efforts to keep well below the lifetime accumulated radiation exposure limit.

TABLE 5
DISTRIBUTION OF TOTAL LIFETIME RADIATION EXPOSURE ASSOCIATED WITH NAVAL NUCLEAR PROPULSION PLANTS

RANGE OF ACCUMULATED LIFETIME RADIATION EXPOSURES (REM)	PERCENTAGE OF PERSONNEL MONITORED IN 1989 WITH LIFETIME ACCUMULATED RADIATION EXPOSURE WITHIN THAT RANGE	
	FLEET	SHIPYARDS
0 - 5	99.68	88.31
5 - 10	0.30	6.87
10 - 15	0.01	2.44
15 - 20	0	1.33
20 - 25	0	0.63
25 - 30	0	0.30
30 - 50	0	0.11
Greater than 50	0	<0.01

Table 6 provides a basis for comparison between the radiation exposure for light water reactors operated by the Navy and commercial power reactors licensed by the Nuclear Regulatory Commission. The 1988 data in this Nuclear Regulatory Commission table covers 102 licensed commercial power reactors with a total of 40,841 man-rem (ref 11). The 1988 average annual exposure of each worker at commercial power reactors was 0.21 rem.* Licensees of commercial power reactors reported 273 overexposures to external radiation during the years 1971 through 1988. Numbers in excess of 5 rem are not necessarily overexposures since Nuclear Regulatory Commission regulations permit exposures of 3 rem each quarter up to 12 rem per year within the accumulated total limit of 5 rem for each year of a person's age beyond eighteen.

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*This average was calculated by dividing total man-rem by total number of workers monitored as is done in Table 4. Ref (11) reports this value as 0.40; however, it is calculated by dividing the total man-rem by the number of workers with measurable exposure.

TABLE 6
PERSONNEL
RADIATION EXPOSURE FOR COMMERCIAL NUCLEAR-POWERED REACTORS LICENSED BY U.S. NUCLEAR REGULATORY COMMISSION

SUMMARY OF ANNUAL WHOLE BODY EXPOSURE BY INCREMENT

YEAR	TOTAL MONITORED	NOT MEASURABLE	NUMBER OF INDIVIDUALS EXPOSURE INCREMENT - REM 0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	>10	TOTAL MAN-REM	NUMBER OF OVER-EXPOSURES
1969	2,838	2,607			134	65	25	5	2	0	0	0	0		
1970	7,509	6,985			166	163	88	98	8	1	0	0	0		
1971	9,581	8,996			315	137	105	17	11	0	0	0	0		2
1972	15,713	14,783			532	199	111	46	21	9	6	6	0		16
1973	33,823	19,043	9,798	2,468	1,584	422	251	71	38	16	7	0	0	13,963	19
1974	38,938	20,472	13,766	2,503	1,378	471	226	86	30	6	0	0	0	13,722	43
1975	44,343	18,852	18,289	3,984	1,872	691	423	169	60	24	12	0	1	20,879	14
1976	61,151	25,704	24,606	4,880	2,354	789	487	188	70	26	11	5	1	26,433	20
1977	67,134	24,868	31,298	6,162	2,837	1,130	569	141	66	36	21	6	0	32,511	27
1978	76,121	30,143	34,983	6,405	2,989	1,080	418	67	26	8	0	0	2	31,804	9
1979	105,313	41,191	51,056	7,898	3,306	1,255	477	86	28	13	2	0	1	39,981	23
1980	127,708	47,377	61,808	11,474	4,515	1,537	686	192	98	18	3	0	0	53,796	73
1981	124,506	42,323	63,403	11,766	4,546	1,793	486	93	81	11	2	1	1	54,142	7
1982	129,275	44,893	66,521	10,855	4,686	1,814	432	56	13	4	0	1	0	52,190	2
1983	136,717	51,071	65,585	12,171	5,311	1,950	544	65	16	4	0	0	0	56,471	8
1984	157,708	59,616	78,702	12,453	4,967	1,675	295	0	0	0	0	0	0	55,214	3
1985	157,340	64,470	78,196	10,557	3,317	716	84	0	0	0	0	0	0	43,040	3
1986	174,518	73,594	86,908	10,678	2,670	593	75	0	0	0	0	0	0	42,523	1
1987	198,531	94,074	91,690	10,792	1,712	241	22	0	0	0	0	0	0	40,697	1
1988	198,985	95,758	90,653	10,264	1,958	342	9	0	1	0	0	0	0	40,841	2

INTERNAL RADIOACTIVITY

Policy and Limits

The Navy's policy on internal radioactivity for personnel associated with the nuclear propulsion program continues to be the same as it was more than three decades ago--to prevent significant radiation exposure to personnel from internal radioactivity. The limits invoked to achieve this objective are one-tenth of the levels allowed by Federal regulations for radiation workers. The results of this program have been that no one has received more than one-tenth the Federal annual internal occupational exposure limits from internal radiation exposure caused by radioactivity associated with Naval nuclear propulsion plants.

The basic Federal limit for radiation exposure to organs of the body from internal radioactivity has been 15 rem per year. There have been higher levels applied at various times for thyroid and for bones; however, use of these specific higher limits has not been necessary in the Naval Nuclear Propulsion Program.

Fifteen rem per year is the limit recommended for most organs of the body by the U. S. National Committee on Radiation Protection in 1954 (ref 1), by the U. S. Atomic Energy Commission in the initial edition of ref (3) applicable in 1957, by the International Commission on Radiological Protection in 1959 (ref 2), and was adopted for Federal agencies when President Eisenhower approved recommendations of the Federal Radiation Council May 13, 1960. Although the International Commission on Radiological Protection revised its recommendations in 1977 (ref 8) to raise limits for most organs,the Naval Nuclear Propulsion Program has not changed the limits.

Source of Radioactivity

Radioactivity can get inside the body through air, through water or food, and through surface contamination via the mouth, skin, or a wound. The radioactivity of primary concern is the metallic corrosion products on the inside surfaces of reactor plant piping systems. These are in the form of insoluble metallic oxides, primarily iron oxides. Ref (12) contains more details on why cobalt 60 is the radionuclide of most concern for internal radioactivity.

The design conditions for reactor fuel are much more severe for warships than for commercial power reactors. As a result of being designed to withstand shock, naval reactor fuel elements retain fission products including fission gases within the fuel. Sensitive measurements are made frequently to verify the integrity of reactor fuel. Consequently, fission products such as strontium 90 and cesium 137 make no measurable contribution to internal exposure of personnel from radioactivity associated with Naval nuclear propulsion plants. Similarly, alpha emitters such as uranium and plutonium are retained within the fuel elements and are not accessible to personnel operating or maintaining a Naval nuclear propulsion plant.

Because of the high integrity of reactor fuel and because soluble boron is not used in reactor coolant for normal radioactivity control in Naval reactors, the amounts of tritium in reactor coolant are far less than in typical commercial power reactors. The small amounts that are present are formed primarily as a result of neutron interaction with the deuterium naturally present in water. The radiation from tritium is of such low energy that the Federal limits for breathing or swallowing tritium are one hundred times higher than for cobalt 60. As a result radiation exposure to personnel from tritium is far too low to measure. Similarly, the low energy beta radiation from carbon 14, which is formed in small quantities in reactor coolant systems as a result of neutron interactions with nitrogen and oxygen, does not add measurable radiation exposure to personnel operating or maintaining Naval nuclear propulsion plants.

Control of Airborne Radioactivity

Airborne radioactivity is controlled in maintenance operations such that masks are not normally required. To prevent exposure of personnel to airborne radioactivity when work might expose radioactivity to the atmosphere, contamination containment tents or bags are used. The areas inside these containments are ventilated to the atmosphere through high efficiency filters which have been tested to remove at least 99.95 percent of particles of a size comparable to cigarette smoke. The occupied area outside these containments is required to be ventilated through high efficiency filters any time work which could cause airborne radioactivity is in progress inside an area such as a reactor compartment. Airborne radioactivity surveys are required to be performed regularly in radioactive work areas. Any time airborne radioactivity above the limit is detected in occupied areas, work which might be causing airborne radioactivity is stopped. This conservative action is taken to minimize internal radioactivity even though the Navy's airborne radioactivity limit would allow continuous breathing for forty hours per week throughout the year to reach an annual exposure to the lungs of one-tenth the Federal limit. Personnel are also trained to use masks when airborne radioactivity above the limit is detected. However, masks are seldom needed and are not relied upon as the first line of defense against airborne radioactivity.

It is not uncommon for airborne radioactivity above the limit to be caused by radon naturally present in the air. Atmospheric temperature inversion conditions can allow this buildup of radioactive particles from radon. Radon can build up above the limit in sealed or poorly ventilated rooms in homes or buildings made of stone. Most cases of airborne radioactivity above the limits in occupied areas in the Naval Nuclear Propulsion Program have been caused by radioactive particles from radon and not from the reactor plant. Procedures have been developed to allow work to continue after it has been determined that the elevated airborne radioactivity is from naturally occurring radon.

Radon is also emitted from radium used for making dials luminous. There have been a number of cases where a single radium dial such as on a wristwatch has caused the entire atmosphere of a submarine to exceed the airborne radioactivity limit used for the nuclear propulsion plant. Radium in any form has been banned from submarines to prevent interference with keeping airborne radioactivity from the nuclear propulsion plant as low as practicable.

Control of Radioactive Surface Contamination

Perhaps the most restrictive regulations in the radiological control program are established in the requirements for the control of radioactive contamination. Work operations involving potential for spreading radioactive contamination use containments to prevent personnel becoming contaminated. The controls for radioactive contamination are so strict that precautions sometimes have had to be taken to prevent tracking contamination from fallout and natural sources into nuclear areas because the contamination control limits used in the nuclear areas were below the levels of fallout and natural contamination occurring outside in the general public areas.

Anticontamination clothing, including coveralls, hood (to cover the head, ears and neck), shoe covers and gloves, is provided when needed. However, the basic approach is to avoid the need for anticontamination clothing by containing the radioactivity. As a result, most work on radioactive materials is performed with hands reaching into gloves installed in containments, making it unnecessary for the worker to wear anticontamination clothing. In addition to providing better control over the spread of radioactivity, this method has reduced radiation exposure since the worker can usually do his job better and faster in his normal work clothing. A basic requirement of contamination control is monitoring all personnel leaving any area where radioactive contamination could possibly occur. Workers are trained to survey themselves, and their performance is checked by radiological control personnel. Personnel monitor before, not after, they wash. Therefore, washing or showering at the exit of radioactive work areas is not required. The basic approach is to prevent contamination, not wash it away.

Surveys for radioactive contamination are taken frequently by trained radiological control personnel. Results of these surveys are reviewed by supervisory personnel to provide a double-check that no abnormal conditions exist. The instruments used for these surveys are checked against a radioactive calibration source daily and prior to use, and they are calibrated at least every six months.

Control of Food and Water

Smoking, eating, drinking and chewing are prohibited in radioactive areas. Aboard ship, drinking water is distilled from seawater by using steam. However, the steam is not radioactive because it is in a secondary piping system separate from the reactor plant radioactive water. In the event radioactivity were to leak into the steam system, sensitive radioactivity detection instruments which operate continuously would give early warning.

Wounds

Skin conditions or open wounds which might not readily be decontaminated are cause for disqualification from doing radioactive work. Workers are trained to report such conditions to radiological control or medical personnel, and radiological control technicians watch for open wounds when workers enter radioactive work areas. In the initial medical examination prior to radiation work and during subsequent examinations, skin conditions are also checked. If the medical officer determines a wound is sufficiently healed or considers the wound adequately protected, he may remove the disqualification.

There have been only a few cases of contaminated wounds in the Naval Nuclear Propulsion Program. In most years, none occurred. Examples of such injuries which have occurred in the past include a scratched hand, a metallic sliver in a hand, a cut finger, and a puncture wound to a hand. These wounds occurred at the same time the person became contaminated. Insoluble metallic oxides which make up the radioactive contamination remain primarily at the wound rather than being absorbed into the blood stream. These radioactively contaminated wounds have been easily decontaminated. No case of a contaminated wound is known where the radioactivity initially present in the wound was as much as one one-thousandth of that permitted for a radiation worker to have in his body.

Monitoring for Internal Radioactivity

The radioactivity of most concern for internal radiation exposure from Naval nuclear propulsion plants is cobalt 60. Although most radiation exposure from cobalt 60 inside the body will be from beta radiation, the gammas given off make cobalt 60 easy to detect. Complex whole body counters are not required to detect cobalt 60 at low levels inside the body. For example, one millionth of a curie of cobalt 60 inside the lungs or intestines will cause a measurement of two times above the background reading with a standard radiation survey instrument. This amount of internal radioactivity will cause the instrument used to monitor personnel for radioactive contamination on their body to reach the alarm level. Every person is required to monitor the entire body upon leaving an area with radioactive surface contamination. Monitoring the entire body is a requirement in the Naval Nuclear Propulsion Program; monitoring just hands and feet is not permitted. Therefore, if a person had as little as a millionth of a curie of cobalt 60 internally, it would readily be detected.

Swallowing one millionth of a curie of cobalt 60 will cause internal radiation exposure of about 0.06 rem. The radioactivity will pass through the body and be excreted within a period of a little more than one day.

One millionth of a curie of cobalt 60 deposited in the lungs as a result of an inhalation incident is estimated to cause a radiation exposure of about 3 rem to the lungs over the following year based on standard calculative techniques recommended by the International Commission on Radiological Protection (ref 13). These techniques provide a convenient way to estimate the amount of radiation exposure a typical individual might be expected to receive from small amounts of internally deposited radioactivity. These techniques account for the gradual removal of cobalt 60 from the lungs through biological processes and the radioactive decay of cobalt 60 with a 5.3 year half life. However, if an actual case were to occur, the measured biological elimination rate would be used in determining the amount of radiation exposure received.

In addition to the control measures to prevent internal radioactivity and the whole body monitoring frequently performed on those who work with radioactive materials, more sensitive monitoring is also performed during radioactive overhaul work. Shipyard procedures for monitoring internal radioactivity use the type of scintillation detectors which will reliably detect an amount of cobalt 60 inside the body that is more than one hundred times lower than the one millionth of a curie used in the examples above. Shipyards typically monitor each employee for internal radioactivity as part of each radiation medical examination, which is performed before initially performing radiation work, after terminating radiation work, and periodically in between.

Shipyards also monitor periodically during the year groups of personnel who did the work most likely to have caused spread of radioactive contamination. Any person who has radioactive contamination above the limit anywhere on the skin of his body during regular monitoring at the exit from a radioactive area is monitored for internal radioactivity with the sensitive detector. Also any person who might have breathed airborne radioactivity above limits is monitored with the sensitive detector.

Results of Internal Monitoring in 1989

During 1989 over 18,000 personnel were monitored for internally deposited radioactivity using sensitive scintillation detectors at the eight shipyards performing work associated with Naval nuclear propulsion plants. Equipment and procedures provide detection of at least 0.01 millionths of a curie.

One person, who was contaminated during maintenance work, had internal radioactivity above this level in 1989. The individual had 0.008 millionths of a curie in her lungs and 0.018 millionths of a curie in her gastrointestinal system. The radionuclide was insoluble cobalt 60. The estimated exposure for this individual was 2 mrem to the gastrointestinal tract and 40 mrem to the lungs due to this intake. No other personnel had internal radioactivity above this level.

EFFECTS OF RADIATION ON PERSONNEL

Control of radiation exposure in the Naval Nuclear Propulsion Program has always been based on the assumption that any exposure, no matter how small, involves some risk; however, exposure within the accepted exposure limits represents a risk small compared with normal hazards of life. The basis for this statement is presented below.

Exposure to Radiation Involves Some Risk

Since the inception of nuclear power, scientists have cautioned that exposure to ionizing radiation in addition to that from natural background involves some risk. The National Committee on Radiation Protection and Measurements in 1954 (ref 1) and the International Commission on Radiological Protection in 1958 (ref 2) both recommended that exposures should be kept as low as practicable and that unnecessary exposure should be avoided to minimize this risk. The International Commission on Radiological Protection in 1962 (ref 14) explained the assumed risk as follows:

> "The basis of the Commission's recommendations is that any exposure to radiation may carry some risk. The assumption has been made that, down to the lowest levels of dose, the risk of inducing disease or disability in an individual increases with the dose accumulated by the individual, but is small even at the maximum permissible levels recommended for occupational exposure."

The National Academy of Sciences-National Research Council Advisory Committee on the Biological Effects of Atomic Radiation included similar statements in its reports in the 1956-1961 period. In 1960, the Federal Radiation Council stated in ref (4) that its radiation protection guidance did not differ substantially from recommendations of the National Committee on Radiation Protection and Measurements, the International Commission on Radiological Protection, and the National Academy of Sciences.

One conclusion from these reports is that radiation exposures to personnel should be minimized. This is not a new conclusion. It has been a major driving force of the Naval Nuclear Propulsion Program.

Studies of the Effects of Radiation on Humans

Tens of thousands of reports have been written on the effects of radiation. Even the list of summary reports is voluminous. In spite of the fact that there are many unanswered questions concerning the effects of radiation on humans, more is known about radiation than almost any substance that can affect humans. More money has been spent to learn the effects of radiation on humans than for any other hazard in our modern society. In fact, the National Academy of Sciences in ref 15 stated: "It is fair to say that we have more scientific evidence on the hazards of ionizing radiation than most, if not all, other environmental agents that affect the general public."

The main effect is cancer. Effects other than cancer have not been found for low-level radiation exposure to adults. The following brief summary of the effects of low-level whole body external radiation is primarily from refs (15) and (16).

The most important data on the effects of whole body external radiation exposure on humans comes from the almost 40 years of extensive study of the Japanese atomic bomb survivors. In addition, studies have been made of the Marshall Islands inhabitants who received about 12,000 man-rem from fallout in 1954. Studies have been made on groups of patients who have had frequent diagnostic x-ray examinations. Numbers of studies have been made on patients who have had radiation therapy for a disease of the bones of the back and for other conditions. These studies predominantly involved radiation doses of greater than 100 rem. The determinations of damage from doses greater than 100 rem have been reasonably consistent from numerous different studies. Extensive irradiation studies of animals have also been used to show what to look for in humans. These animal studies also show under controlled conditions not available in studies on humans how the radiation effects change with amount and frequency of radiation exposure.

Results of radiation studies on humans show the highest rates of cancer occur in the thyroid and the female breast, although the death rate for thyroid cancer is low. The cancer rates from radiation are lower for leukemia and lung cancer, and lower still for cancers of the bone and other organs. Leukemia has been associated with radiation exposure in almost every study of radiation on humans. Reasons for this include the improved diagnosis of leukemia in recent decades and the low natural incidence of leukemia compared to other cancers. However one type of leukemia, chronic lymphatic leukemia, has not been found in any study to be associated with radiation. Some organs appear to be so resistant to radiation-induced cancer that there has been no clear association between radiation and cancer in these organs. One example is the prostate gland.

One characteristic of cancer caused by low-level radiation is the long delay time between time of radiation exposure and time of diagnosis of cancer. Cancer is not diagnosed until more than a few years have elapsed. In the Japanese atomic bomb survivors, the end of the latent period for leukemia was about 25 years. For the sum of all types of cancers ref (16) assumes that in 25 years one-half the cancers will have occurred.

Cataracts of the eyes can be caused by radiation. However, cataract formation appears to have more evidence of having a threshold radiation dose than any other radiation damage studied. Very high radiation doses have been required to produce cataracts. Ref (15) states that single exposures of 200 to 500 rem or fractionated exposures of 1,000 rem are the threshold exposures required to produce damage to the lens of the eye sufficient to interfere with vision.

Genetic effects can also be caused by radiation. However, genetic effects greater than the natural incidence rate have not been demonstrated in human populations exposed to radiation. Genetic effects are changes in human genes that do not pose a risk to the parent but could cause birth defects in offspring. The current natural rate of genetic effects is approximately 10 percent of all live births and range from trivial effects, such as hair and eye color changes, to more serious disorders. No increase in the natural rate of genetic effects has been found in studies of the 35,000 children conceived by parents irradiated as a result of the nuclear explosions in Hiroshima and Nagasaki in 1945.

Sterility, which is not a genetic effect, can be caused by radiation. However, according to ref (15), the radiation exposure required to cause sterility in males is very high, probably in excess of lethal exposures. Scientific reports of several decades ago speculated that radiation might cause a general effect that would shorten life, similar to aging. Reports in the last decade conclude such an effect has not been found in studies on humans. Nor have numerous other diseases such as heart disease been associated with radiation in these studies. To date the chief effect of radiation on humans has been found to be cancer.

In 1978, Dr. T. Najarian, assisted by the Boston Globe, issued a sensationalized report which alleged that Portsmouth Naval Shipyard (PNS) workers who were occupationally exposed to low-level radiation suffered twice the expected rate of overall cancer deaths and five times the expected rate of leukemia deaths. This report was based on an informal review of several hundred death records, without any official input. It caused a number of frightening news stories. The National Institute for Occupational Safety and Health (NIOSH) was subsequently directed by Congress to investigate Dr. Najarian's report.

Under contract with NIOSH, Dr. Najarian's study was repeated using data the Navy made available to NIOSH. In June 1979, Dr. Najarian testified before Congress on the results of the reanalysis based on official data. In his testimony Dr. Najarian repudiated his earlier findings of increased overall cancer and leukemia. His third finding of increased blood cancers was separately repudiated at that time by the National Cancer Institute.

In December 1980, NIOSH finished their investigation based on approximately 25,000 Portsmouth Naval Shipyard (PNS) workers and issued a final report. This report (ref 17) states that NIOSH found no excess of deaths due to leukemia or other cancers among the Shipyard workers. This report specifically states:

> "No relationship between exposure to radiation and mortality from any cause was observed among the PNS population when compared to the United States white male population. Furthermore, no excess in leukemia mortality was observed in the radiation exposed population when compared to the non-radiation exposed employees of PNS."

In February 1985, NIOSH completed another study (ref 29) called a case-control study which examined the leukemia question at Portsmouth using a more sophisticated method. This study looked at all the leukemia cases (53) compared to a select group of controls (212) who shared common characteristics with the cases. The study concentrated both on exposure to radiation and exposure to solvents. It found that approximately the same proportion of cases and controls received 1 rem or more of radiation dose. A similar finding was made relative to solvents. Thus, NIOSH concluded:

> "No statistically significant positive association of leukemia with either radiation or solvent exposures was found."

Thus, the earlier reports of excess cancer rates among Portsmouth Naval Shipyard workers exposed to low-level radiation were not substantiated by NIOSH.

The Department of Energy is sponsoring a more comprehensive shipyard epidemiologic study. The study is being performed by Johns Hopkins University and will include radiation workers in all shipyards doing Naval nuclear propulsion plant work so that its findings will be based on a much larger population. The report is presently in the report preparation phase.

Numerical Estimates of Risk from Radiation

In 1972, both the United Nations Scientific Committee on the Effects of Atomic Radiation and the National Academy of Sciences-National Research Council Advisory Committee on the Biological Effects of Ionizing Radiations issued reports (refs 18 and 19) which estimated numerical risks for specific types of cancer from radiation exposure to humans. In 1977, both the International Commission on Radiological Protection and the United Nations Scientific Committee on the Effects of Atomic Radiation issued reports (refs 8 and 16) reconfirming these risk estimates. The risk estimates from both refs (8) and (16) can be briefly summarized as follows:

> In a large population group (such as 100,000 people) receiving an annual total of 10,000 man-rem year after year, the increased risk from this radiation appears to be in the region of about one fatal cancer case each year and about one leukemia case every five years in excess of the normal numbers of cases.

This can be used to develop a risk estimate for personnel exposed to radiation associated with Naval nuclear propulsion plants. In all shipyards there have been a total of about 152,000 personnel monitored for exposure to radiation, and their exposure rate has averaged about 5,100 man-rem per year. Therefore, there should be less than one excess fatal cancer per year and less than one excess leukemia case every five years among the total 152,000 shipyard personnel who have ever been monitored for radiation associated with Naval nuclear propulsion plants.

According to refs (8) and (16), this risk estimate is likely to be substantially overstated because the radiation exposures are from gamma radiation at low doses and low dose rates. Also, exposure to neutrons and exposure from internal radioactivity in the Naval Nuclear Propulsion Program are too low to have the confusing effects noted in some studies of the effects of radiation on humans. The National Academy of Sciences National Research Council Committee on Biological Effects of Ionizing Radiation issued a report in 1980 (ref 15) which also stated that the risk estimates in refs (8) and (16) for low-level exposure may be overestimated. This report recommended that the risk of dying of cancer from low-level radiation exposure be estimated based on a model which yields lower risk estimates than those reported in refs (8) and (16). For simplicity, the discussion which follows will use the earlier conservative estimates in refs (8) and (16).

Radiation exposure received by Naval personnel assigned to nuclear-powered ships and their support facilities has averaged about 1800 man-rem per year. Therefore, according to refs (8) and (16) there should be less than one excess fatal cancer every five years and less than one excess leukemia case every twenty-five years among the approximately 81,000 Naval personnel who have ever been monitored for occupational exposure to radiation associated with Naval nuclear propulsion plants. Since only a few percent of the total man-rem to ship personnel is from neutrons, the same qualifications apply as were mentioned for shipyard personnel, and this risk estimate is likely to be substantially overestimated.

The National Academy of Sciences - National Research Council has recently published (ref 31) an update to their 1980 report. The new report presents risk estimates that are higher than those discussed above. They are based on new risk models, revised dose estimates for Japanese atomic bomb survivors, and additional data on cancers experienced by both atomic bomb survivors and persons exposed to radiation for medical purposes. The National Academy of Sciences report is actively being reviewed by the Navy and the scientific community in general. As this review is not yet complete, this report uses the older risk estimates for comparison purposes.

The new risk estimates require some perspective. Although these estimates are larger than the old, they themselves are still small. That is, a small number times a small number is still a small number. Due to the very low occupational radiation exposure received by personnel in the Naval Nuclear Propulsion Program, the new risk estimates do not change the fact that the risk from radiation exposure associated with Naval nuclear propulsion plants is low compared to hazards normally accepted in industrial work and in daily life outside of work.

Radiation Exposure Comparisons

To help put this risk estimate in perspective, comparisons are needed. For example, in a typical group of 10,000 people in the U. S., a total of 1600 will die of cancer (ref 20). If each of the 10,000 received over his lifetime one rem more than he was already receiving from background and medical sources, then according to the preceding risk estimate one extra person would die of cancer. Therefore, the 1,600 cancer deaths would increase to 1601 for this group of 10,000. This example is directly applicable to the Naval Nuclear Propulsion Program where the average lifetime occupational radiation exposure is one rem.

However, a few highly controversial studies have concluded that more people would die from radiation than the National Academy of Sciences and United Nations committees predict. If the higher risk estimate of one well known study is applied to the same population group of 10,000, then the 1,600 cancer deaths would increase to 1,610.

The current controversy over effects of low-level radiation is whether one extra rem to each of 10,000 people will cause the normal number of 1,600 cancer deaths to increase to 1,601, or to 1,610. The 1,601 figure is the current best estimate. Studies are now underway to attempt to refine the accuracy of the estimates.

The following examples give further perspective on what radiation exposure means:

- Of all industrial and medical radiation workers in the United States, about 15,000 die each year from cancer. It is estimated that only 25 additional cancer deaths occur per year as a result of radiation exposure from their work.

- Radiation from the nuclear accident at Three Mile Island may add one fatal cancer death to the public within fifty miles. Of the two million people living within this fifty mile radius, more than 300,000 are expected to die of cancer from causes other than the radioactivity released from this accident.

- The average occupational radiation exposure of all those monitored in the Naval Nuclear Propulsion Program is about 0.18 rem per year. This is only slightly greater than the average radiation exposure received in the U. S. each year from natural background and medical x-rays. (Derived from ref 21).

- The average lifetime occupational radiation exposure of one rem for personnel in the Naval Nuclear Propulsion Program is less than one tenth the amount of radiation exposure these same personnel will average over their lifetimes from natural background and medical x-rays. (Derived from ref 21).

- This one rem average lifetime occupational radiation exposure can also be compared very roughly to the 5 rem received in a year from smoking one pack of cigarettes per day. This comparison is not exact because it requires more lung exposure from natural radioactivity in tobacco to cause the same amount of risk as whole body gamma radiation. (ref 22)

- The risk of dying from an automobile accident is forty or more times higher than the risk of fatal cancer for the average person with 1 rem lifetime radiation exposure.

- The average lifetime occupational radiation exposure of one rem for personnel in the Naval Nuclear Propulsion Program is less than one-tenth of the amount of radiation exposure these same personnel will average over their lifetimes due to naturally occurring radon daughter products which are present in the indoor atmosphere of their homes. Exposure due to radon daughter products has recently been identified as a major contributor to radiation exposure of the general population. Radon is estimated to contribute an average of 0.2 rem per year (ref 31) above the exposure a person normally receives from natural background (excluding radon) and medical x-rays. Thus, the comparisons above do not account for radon daughter product exposure.

The total occupational radiation exposure of 4,530 man-rem received by all personnel in the Naval Nuclear Propulsion Program in 1989 can be compared to the many other sources of radiation exposure received by the U. S. population. Examples follow:

- 20,000,000 man-rem to the population of the U. S. each year from natural background radiation (ref 21).
- 17,000,000 man-rem to the population of the U. S. each year from medical and dental radiation (ref 21).
- 650,000 man-rem to the population of the U. S. each year from radioactivity in natural gas used for cooking (ref 22).
- 100,000 man-rem the one million inhabitants of Denver could save each year if they moved to a region such as Washington, D. C. with lower natural background radiation levels (Derived from ref 21).
- 12,000 man-rem total to passengers in jet airplane flights in the United States from increased cosmic radiation at the higher altitudes used by jets (ref 23).

Thus, the total occupational radiation exposure received by all personnel in 1989 is less than one ten-thousandth of the total radiation exposure received by the U. S. population from all sources. The risk from occupational radiation exposure in the Naval Nuclear Propulsion Program is also less than the risks these same personnel face from natural background radiation or from medical radiation. To demonstrate this, the 152,000 personnel monitored for radiation in all shipyards over the last 36 years will receive about 15,200 man-rem per year from natural background and about the same from medical radiation. The average occupational exposure to this group has been about 5,100 man-rem per year.

Using Table 7 for example, risk estimates for radiation should also be compared to other risks normally encountered in industrial activities.

TABLE 7

DEATH RATES IN U. S. FOR VARIOUS CAUSES

CAUSE	ANNUAL DEATHS PER 100,000 POPULATION
Smoking (ref 24)	150
Motor Vehicle accidents (ref 25)	22
Work accidents (ref 25)	
Mining, quarrying	63
Construction	57
Agriculture	54
Transportation and Public Utilities	31
All Industries Average	14
Government	11
Services	9
Manufacturing	9
Trade	6
Industrial accidents in a Naval Shipyard (eight shipyards 1972-1977)	7
Commercial air travel (ref 25)	1
Coal-fired electric power (estimate derived from ref 26)	1 to 10
Radiation associated with Naval Nuclear propulsion plants (risk estimate)	Less than 1

The risk estimate in Table 7 for radiation associated with Naval nuclear propulsion plants is based on the average occupational exposure per year of all monitored personnel. Within this group, of course, there are those whose exposures are greater or less than the average. As a measure of the risk to a worker who receives a greater than average exposure, it may be useful to look at a hypothetical worker who receives 50 rem over his working lifetime. Such a worker's average annual risk of developing a fatal cancer would not exceed 1 in 10,000. As indicated by the above table, 1 in 10,000 (10 in 100,000) is the annual fatal accident rate in the United States of the safest industries. Death rates are considerably higher than 1 in 10,000 for non-work activities such as driving a car or smoking. It should be noted (Table 5) that less than one percent of all current workers at shipyards have lifetime exposures in excess of 25 rem.

Because of these estimates on the risk of low-level radiation, extra hazard pay for radiation work has never been paid in the Naval Nuclear Propulsion Program. Civil Service Commission regulations do not provide for hazard pay for radiation work. A serious disadvantage to extra pay for radiation risks is that it would tend to increase the difficulty in minimizing radiation exposure because some personnel would press for more radiation to maximize their pay.

Extrapolations

In radiation, as in other areas, a most effective way to frighten people is to proclaim that no one knows what the effects are. This has been repeated so often that it has almost become an article of faith that no one knows the effects of low-level radiation on humans.

One could well state, "No one knows the risks of smoking a few cigarettes," but the risks of smoking a large number of cigarettes are well known. If 10,000 people smoke an average of four cigarettes a day, about 100 deaths will result; data are not available for lower smoking rates. For radiation, doses of 100 rem to each of 10,000 people would be required to cause an equal number of deaths. The effects of radiation on humans at doses of 100 rem are well known. The controversy over radiation risks today is how to extend the risk estimates to even lower levels. As we get to lower levels, it becomes more and more difficult to detect the effects.

The figures just presented can be extended to show that one rem has about the same risk of death as smoking one cigarette per month. This comparison is only to show that finding out the effect on the death rate of one rem of exposure is about the same as trying to find out the effect of smoking one cigarette a month.

In summary, the effect of one rem is extremely small. There are physical limits to how far scientists can go to ascertain precisely the size of this risk, but it is known to be small. Instead of proclaiming how little is known about low-level radiation, it is more appropriate to emphasize how much is known about the small actual effects.

Conclusions on the Effects of Radiation on Personnel

This perspective provides a better position to answer the question, "Is radiation safe?" If safe means zero effect, then the conclusion would have to be that radiation is unsafe. But to be consistent, background radiation and medical radiation would also have to be considered unsafe. Or more simply, being alive is unsafe.

"Safe" is a relative term. Comparisons are necessary for actual meaning. For a worker, safe means the risk is small compared to other risks accepted in normal work activities. Aside from work, safe means the risk is small compared to other risks routinely accepted in life.

Each recommendation on limits for radiation exposure from the key organizations referenced has emphasized the need to minimize radiation exposure. Thus, the Navy is committed to keeping radiation exposure to personnel as low as reasonably achievable. No level of radiation exposure has been identified for which responsible organizations have stated there is no effect. Similarly it is difficult to find a single activity of man for which one can confidently state the risk is zero. However, the above summaries show that the risk from radiation exposure associated with Naval nuclear propulsion plants is low compared to hazards normally accepted in industrial work and in daily life outside of work.

CLAIMS FOR RADIATION INJURY TO PERSONNEL

Personnel who consider they have or might have had occupational injury may file claims. Naval shipyard personnel are employees of the U. S. Government and therefore file claims with the U. S. Department of Labor's Office of Workmen's Compensation. Shipyards hold no hearings on injury claims. They are not handled in an adversary procedure. The Navy has no rights to present a case to the Labor Department. The claim does not even have to be filed through the shipyard. The shipyard is not permitted to appeal a decision, but the employee may appeal. The primary consideration in the Federal laws and procedures set up for injury compensation is to take care of the Federal employee. The program to compensate Federal employees is well publicized.

In private shipyards injury compensation claims are handled under the Longshoreman's and Harbor Workers' Compensation Act. The claim may be handled through the shipyard's insurance carrier or by a U. S. Department of Labor claims examiner. Either the employee or the employer may appeal.

Claims for military personnel concerning prior duty are handled through the Veterans Administration.

There have been a total of 203 claims filed for injury from radiation associated with Naval nuclear propulsion plants. One-hundred-seven originated from employees of the six Naval shipyards, fifty-two from private shipyards and forty-four from Navy personnel. These claims are summarized in Table 8. As shown in Table 8 more than half the claims have been filed for injuries other than cancer or leukemia. Three-fourths of the claims filed for cancer or leukemia involved workers with lifetime radiation exposures less than the 5 rem, which is the exposure a nuclear worker is permitted to receive in one year by Federal Regulations.

TABLE 8

CLAIMS FOR RADIATION INJURY TO PERSONNEL

Injury Claimed	Claims Filed	Claims Awarded	Claims Denied or Deferred	Claims Active
Leukemia	28	2	17	9
Cancer Other Than Leukemia	63	1	46	16
Other	112	5	88	19
TOTAL	203	8	151	44

Eight claims have been awarded for which radiation was an alleged causal agent: two for leukemia in 1968 and 1979; four for cataracts of the eyes in 1971, 1974, 1977, and 1982; one for leukocytosis in 1969 and one for bile duct/pancreatic cancer in 1980. The Office of Workmen's Compensation awarded three claims and the Veteran's Administration awarded five claims. For VA claims, other considerations such as whether the injury is reasonably considered to have occurred while the claimants was in the Armed Forces and other causal factors are used when awarding claims. The Navy considers all eight of these awards were unjustified on the basis of radiation exposure as follows:

- One leukemia case had a lifetime occupational exposure of 5.38 rem. The claimant had also received hundreds of rem in medical radiation exposure for adenoids. If radiation were to be selected as the cause of this leukemia, then the occupational exposure could not have been more than a tiny part of the total radiation exposure.

- The second leukemia case had a lifetime occupational exposure of 1.00 rem. This amount of radiation exposure is small and less than 10 percent of the amount of exposure the claimant will receive during his life from natural background and medical radiation.

- Two of the cataract cases had lifetime radiation exposures of about 3 rem, one case had less than 1 rem, and one case had 0.02 rem. Of these cases, even the highest exposure, 3 rem, is hundreds of times smaller than needed to produce cataracts in the eyes.

- The leukocytosis (elevated white blood cell count) case had a lifetime occupational exposure of 15.5 rem which was received over an eight year period. This case was evaluated by the medical research center of a national laboratory, which concluded that the cause of the leukocytosis was unknown. In addition, leukocytosis has not been shown to be associated with low-level occupational radiation exposure.

- The bile duct and pancreatic cancer case was awarded for a lifetime occupational exposure of 2.37 rem. This amount of radiation is less than the quarterly limit of 3 rem and the overall limit of 5 rem. Further, this person received about four times the amount of his occupatioal exposure from natural background and medical exposures over his lifetime.

In addition to the above claims, four suits have been filed in court alleging injury from radiation. One suit involved leukemia; two involved cancers; and the fourth did not involve a cancer. All four suits have been resolved.

AUDITS AND REVIEWS

Checks and cross-checks, audits, and inspections of numerous kinds have been shown to be essential in maintaining high standards of radiological control. First, each worker is specially trained in radiological control as it relates to his own job. Second, written procedures exist which require verbatim compliance. Third, radiological control technicians and their supervisors oversee radioactive work. Fourth, personnel independent of radiological control technicians are responsible for personnel radiation exposure records.

Fifth, a strong independent audit program is required covering all radiological control requirements. In all shipyards this radiological audit group is independent of the radiological control organization and its findings are reported regularly to senior shipyard management, including the shipyard commander. This group performs continuing surveillance of radioactive work. It conducts in-depth audits of specific areas of radiological control. This group checks all radiological control requirements at least annually.

Sixth, the U. S. Department of Energy assigns to each shipyard a representative who reports to the Director of the Naval Nuclear Propulsion Program at headquarters. One assistant to this representative is assigned full time to audit and review radiological controls, both in nuclear-powered ships and in the shipyard. Seventh, Naval Nuclear Propulsion Program headquarters personnel conduct periodic inspections of radiological control in each shipyard. Similarly, there are multiple levels of audits and inspections for the other Naval shore facilities, tenders, and nuclear-powered ships.

In addition, various aspects of the Naval Nuclear Propulsion Program have been reviewed by other Government agencies. For example, the National Institute for Occupational Safety and Health conducted an evaluation of the radiological controls program at Portsmouth Naval Shipyard in conjunction with its mortality study at the shipyard (discussed earlier in this report). NIOSH published the results of its evaluation in a report (ref 27) in April 1983, which stated the following conclusions (quoted verbatim):

- The employee dose data provided NIOSH by Portsmouth Naval Shipyard is complete and provides a reasonable estimate of the individual worker's dose.
- The Portsmouth Naval Shipyard personnel dosimetry program provides accurate internal and external dose data.
- The external and internal doses received by Portsmouth Naval Shipyard personnel are low compared to present occupational exposure guidelines.

- The probability of unreported accidents/incidents or undocumented exposures is extremely small.
- The radiological controls employed are adequate to protect the worker from internal and external hazards.
- The impact of the nuclear work at Portsmouth Naval Shipyard to the surrounding environment is minimal or negligible.
- Nuclear operations at Portsmouth Naval Shipyard are not contributing a significant radiation dose to the general public.

ABNORMAL OCCURRENCES

It is a fact of human nature that people make mistakes. The key to a good radiological control program is to find the mistakes while they are small and prevent the combinations of mistakes that lead to more serious consequences. The preceding section on inspections supports the contention that the Naval Nuclear Propulsion Program gives more attention to errors and their prevention than to any other single subject. Requiring constant focus on improving performance of radiological work has proven effective in reducing errors.

In addition, radiological control technicians are authorized and required to stop anyone performing work in a manner which could lead to radiological deficiencies. One definition of "deficiency" is a failure to follow a written procedure verbatim. However, the broadest interpretation of the term "deficiency" is used in the Navy's radiological control program. Anything involved with radiation or radioactivity which could have been done better is also considered a radiological deficiency.

Radiological deficiencies receive management attention. But there is a higher level of deficiency that is defined as a radiological incident. Incidents receive further management review, including evaluation by senior personnel at headquarters and review by the Director of the Naval Nuclear Propulsion Program. Improvement programs over the years have constantly aimed at reducing the numbers of radiological incidents. As improvements occurred, the definition of what constituted an incident was changed to define smaller deficiencies as incidents. These changes were necessary so that the incident reporting system would continue to play a key role in upgrading radiological controls. As a result, it is not practicable to measure performance merely by counting numbers of radiological incidents or deficiencies.

The Department of Energy and its predecessors have used a separate reporting system that has been nearly constant over time and therefore can be used as a basis for comparison. This system uses levels of severity to define radiological occurrences (ref 28). Examples of radiation exposure incidents in each type follow:

- Type A - individual external radiation exposure over 25 rem in one incident or one year
- Type B - individual external radiation exposure over 5 rem in one quarter year
- Type C - external whole body radiation exposure over 3 rem in one quarter year

The Nuclear Regulatory Commission also has criteria defining abnormal occurrences. The Navy regularly evaluates radiological events using these criteria for comparison; results are reported in Table 9.

TABLE 9

ABNORMAL OCCURRENCES IN THE NAVAL NUCLEAR PROPULSION PROGRAM

Year	Number of Abnormal Occurrences*
1978	0
1979	0
1980	0
1981	0
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	0
1989	0

*Abnormal occurrences are reported here if the Navy evaluation determines they meet either the Department of Energy criteria for Type A radiation exposure incidents or the Nuclear Regulatory Commission criteria for quarterly report to Congress as abnormal radiation exposure occurrences.

The policy of the Navy is to provide for close cooperation and effective communication with state radiological officials involving occurrences that might cause concern because of radiological effects associated with the ships or shore facilities. The Navy has reviewed radiological matters with state radiological officials in the states where Naval nuclear-powered ships are based or overhauled. Although there were no recent occurrences which resulted in radiological effects to the public outside these facilities or which resulted in radiological injury to residents of the states working inside these facilities, states were notified when inquiries showed public interest in the possibility such events had occurred.

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STATEMENT
SUBMITTED BY

THE UNITED STATES NUCLEAR REGULATORY COMMISSION

TO THE

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
COMMITTEE ON APPROPRIATIONS
UNITED STATES HOUSE OF REPRESENTATIVES

CONCERNING
THE FY 1991 BUDGET
FOR THE
NUCLEAR REGULATORY COMMISSION

PRESENTED BY
KENNETH M. CARR
CHAIRMAN

SUBMITTED: March 21, 1990

Mr. Chairman and members of the Committee, the Commission is pleased to appear before you today to present the Nuclear Regulatory Commission's fiscal year 1991 budget request. Accompanying us are NRC's Executive Director for Operations, the General Counsel, and principal office directors.

NRC MISSION

As you know, the NRC is responsible for assuring that civilian uses of nuclear materials in the United States -- in the operation of commercial nuclear power plants, and in medical, academic, and industrial applications -- are carried out in a way which will adequately protect the public health and safety, the environment, and the national security. The NRC has contributed significantly to the safe use of this nuclear technology through firm and fair regulation, emphasis on programs that enhance safe operation of facilities, and conduct of research that resolves regulatory safety issues. When the NRC has encountered situations at reactors, fuel cycle facilities, or materials licensees that could lead to adverse public health and safety effects, we have acted to ensure that licensees corrected these problems before injury to the public occurred. We will continue to vigorously pursue a policy which ensures that our nuclear licensees meet their safety responsibilities to protect the public.

Nuclear Power

Nuclear power is an important component in our nation's energy supply. In 1989, nuclear power safely supplied approximately 20 percent of the nation's electricity, second only to coal. However, we think it is important to note that if the rate of increase in electrical demand in the United States continues at a modest two or three percent a year, then the United States, even with diligent conservation efforts, will need to significantly increase its total electrical generating capacity in the years ahead. To meet this increased demand, options for new baseload generating capacity should be available as safe sources of energy. A number of significant changes have occurred in the last few years which should continue to ensure the viability of nuclear power as one of the safe alternatives to meet our future energy needs. These include an overall improvement in safety and performance as well as initiatives to streamline the licensing process.

There remain, however, several high priority issues that require resolution. One of these is the development of the proper regulatory base to prepare for plant life extension and the resulting reactor license renewal. A period of intense effort is needed to ensure that all relevant safety questions are resolved before the current operating licenses begin to expire later in this decade.

The research effort evaluating the impact of plant aging on component and system safety performance is closely tied to the plant life extension issue. The groundwork must be laid now if we are to make intelligent decisions as to whether the nation's existing plants may remain in service. These plants represent a significant portion of the nation's electrical supply. Timely resolution of this issue must be accomplished if our future energy needs are to be met successfully.

Certification of standardized nuclear power plant designs is another very important issue facing us. We are giving priority to actions needed to anticipate and resolve safety issues for certification of designs for the next generation of reactors. This is essential if future U.S. nuclear power plants are to be built and licensed to operate in a reasonable period of time.

Standardization can significantly increase confidence in the safety, reliability, and availability of future nuclear power plants. Changes in NRC's regulations made during the past year should substantially improve the certification and licensing process. The goal is that future nuclear plants will use standardized designs, approved by the NRC, and pre-approved sites. The NRC is currently involved in a phased review of the Electric Power Research Institute's advanced light water reactor requirements document and in two design certification reviews. We also expect additional design applications will be received during the next year or two. NRC anticipates certifying one or more of these advanced designs in the near future.

Additionally, since a serious accident anywhere can have widespread consequences, another important issue is that of ensuring greater nuclear power plant safety worldwide. In recent years, the NRC has expanded its program for international cooperation in nuclear safety, particularly in the area of information exchange with countries that have commercial nuclear power programs. For example, along with the Department of Energy, we are participating in numerous cooperative activities with the Soviet Union. Our cooperative efforts in sharing safety and operational experience will serve to make commercial nuclear power safer everywhere.

We would now like to focus on our fiscal year 1991 budget request.

FISCAL YEAR 1991 BUDGET REQUEST

Our fiscal year 1991 budget request is $475 million. The Commission believes that this request is necessary for us to maintain the safe performance of the nation's operating nuclear power reactors, achieve further safety improvements, and conduct a regulatory program responsive to the nation's future energy needs and industry initiatives.

Placed in a historical context, this request is fully justified. The NRC's funding has been eroded significantly by inflation since NRC was established in 1975. In constant 1975 dollars, the NRC's fiscal year 1991 budget request is less than the agency's budget in fiscal year 1978 -- one year before the accident at Three-Mile Island. Since that time, the number of licensed nuclear power plants has increased by 75 percent. Currently there are 113 such plants across the nation. Our inspection and oversight activities for each of these plants have also increased significantly over the past decade. In addition, the NRC now has increased responsibilities and activities for nuclear materials licensees, low-level radioactive waste, and licensing the first-of-a-kind high-level waste geologic repository. We must also address important safety issues related to reactor license renewal and standard plant designs. The lack of corresponding growth in NRC's funding has forced the deferral of significant programs that were intended to provide technical information to make and support our future safety decisions. This trend must be reversed. It is essential that the NRC be adequately funded.

The President's fiscal year 1991 budget proposes to continue to fund NRC activities associated with the Nuclear Waste Policy Act through direct appropriation from the Nuclear Waste Fund. The President's budget also proposes to recover 100 percent of NRC's remaining budget through user fees charged to the industry.

Our budget request is $23.4 million above fiscal year 1990. Twelve million six hundred thousand dollars of the requested increase is urgently needed to improve the safety performance of operating reactors and materials licensees and to be responsive to the nation's future energy needs and industry initiatives. This portion of the increase will allow NRC to:

- establish the criteria for renewing reactor licenses beyond their current 40-year term to ensure that operating license renewal applications can be reviewed on a schedule compatible with industry submittals. The first application is expected in 1991;

- establish licensing criteria and be prepared to respond to both the industry's and the Department of Energy's schedule for submitting advanced standard reactor designs for approval;

- reduce the volume and complexity of the technical specifications under which all reactors are required to operate;

- resolve, in a timely manner, the technical issues to support regulatory decisions on reactor safety systems and containments for operating plants as well as those for advanced reactor designs to further enhance the protection of the public in the event of a severe accident;

- conduct additional inspections of materials licensees, improve the accounting of approximately 200,000 generally licensed nuclear materials devices, begin the review of approximately 18,000 materials and fuel cycle facility licenses terminated since 1965 to ensure that the sites were adequately decontaminated, and initiate financial reviews for non-reactor licensees to ensure compliance with new decommissioning requirements;

- develop the regulatory framework for, and review a first-of-a-kind application to construct and operate the nation's first privately owned uranium enrichment facility. The application is expected to be submitted in fiscal year 1991 by Louisiana Energy Services.

- provide full regulatory support for the implementation of the Low-Level Radioactive Waste Policy Amendments Act. This includes expanded research to assess alternatives to shallow land burial for low-level waste and additional assistance to Agreement States as they proceed with developing and implementing plans to construct low-level waste disposal facilities.

Ten million dollars additional is also required for nondiscretionary expenses. The NRC is faced with:

- higher payroll expenses resulting primarily from pay raises and additional agency contributions to the Federal Employees Retirement System;

- increased transportation costs for our inspectors to travel to licensee sites;

- phased replacement of outdated office systems equipment; and

- costs related to the consolidation of our headquarters employees in Rockville, Maryland. The Congress has repeatedly supported our efforts in this regard. We have now consolidated more than one half of our headquarters employees at one location, and we are continuing to actively pursue with the General Services Administration the completion of this consolidation. From what we have seen thus far, we believe that the benefits the agency will derive from complete headquarters consolidation will enhance our ability to protect the public health and safety.

We are also requesting an additional $800,000 for the Office of the Inspector General. The increase is needed to staff the Inspector General's hotline, inspection team, and contract audit capability. The contract audit capability will be new to the NRC and is needed to meet the requirements of the Inspector General Act and Office of Management and Budget directives.

The Commission firmly believes that these increases are essential. The details of our budget request are contained in our submission, which has already been provided to the Committee. The Appendix to this testimony summarizes the agency's budget request for each of its programs. I will briefly summarize the principal programs.

PROGRAM SUMMARY

Reactor Safety and Safeguards Regulation

These programs focus principally on operational safety to evaluate reactor and licensee performance through a variety of on-site inspections and safety reviews for the 113 reactors that are expected to be licensed to operate in fiscal year 1991. The fiscal year 1991 increases for this program focus on preparing NRC to carry out licensing activities to respond to the nation's future energy needs.

As part of NRC's inspection programs, at least two resident inspectors are assigned to each reactor site to observe, evaluate, and report on the adequacy of licensee nuclear safety activities on a day-to-day basis. Our region-based inspectors, headquarters safety experts and specialized technical contractor support will continue to conduct a variety of highly specialized inspections. These complementary resources help us to gain an in-depth perspective on reactor operational safety. Our reactor inspection programs are conducted to allow regional and headquarters managers to focus inspections on special safety problems and plants that require additional attention. This flexibility helps ensure that the limited resources are efficiently and effectively allocated to enhance reactor safety.

There are two other essential components of reactor safety. The first is to evaluate the need for safety improvements to ensure that operating reactors maintain adequate levels of protection of public health and safety subsequent to receiving their operating license. For example, the NRC is in the process of working with licensees to convert existing reactor technical specifications to new standard technical specifications. The NRC believes this will improve operational safety and reduce unnecessary regulatory burdens, thus allowing licensees to focus on the more safety-significant aspects of operation. The second is to ensure that each nuclear power plant is staffed with trained and qualified reactor operators. Toward this end, the NRC licenses all personnel authorized to operate reactors and administers requalification examinations to verify their continued proficiency.

The above programs play a significant role in ensuring the operating industry's safety performance.

The NRC's efforts to renew licenses for operating reactors beyond their current 40 year terms have to be significantly expanded to provide the framework for energy planners to make crucial decisions on new plant purchases, to avoid unneeded regional energy shortfalls, and to avoid increased consumer cost connected with unstable regulatory programs. This program must be fully in place by the mid 1990s to deal effectively with decisions potentially affecting almost 20 percent of the nation's electric supply. In fiscal year 1991, the NRC will prepare and implement the regulatory criteria needed for the license renewal process and will begin to review the first of two lead applications to renew nuclear power plant operating licenses.

Next, the standardization of nuclear power plant designs is an important Commission initiative that can significantly increase confidence in the safety, reliability, and availability of future nuclear power plants. Standardization will allow for a more expeditious and efficient review process and a more thorough understanding of the designs by the NRC. In support of this goal, the NRC will continue to conduct design certification reviews for evolutionary reactor designs and prepare procedurally and technically for the receipt of applications for advanced standardized designs.

Nuclear Safety Research

The NRC's nuclear safety research program improves our regulation through better definition of reactor safety margins, increased understanding of severe accident phenomenology and containment challenges, and development of new analytical tools needed to evaluate new safety issues as they arise. Our research program provides the independent expertise and information we need to make timely regulatory judgments, anticipates problems of potential safety significance so that new or expanded knowledge can assist the NRC in fulfilling its responsibilities, and develops the regulations and regulatory guides necessary to implement Commission policy or technical requirements.

The Commission believes that a stable safety research program is essential to provide a foundation for the strong and credible regulation needed to maintain and improve the nation's current civilian nuclear safety record. We cannot overemphasize the fact that a moderate increase in funding (which in reality is a restoration of cuts in the program over previous years) is critical for the success of long-range research and the stability of the program.

The fiscal year 1991 program will include increases primarily in the following areas:

> Research will be accelerated on the effects of irradiation and aging on reactor vessels, piping and support structures and other safety related equipment. This work is needed to

provide the technical basis for regulatory decisions regarding continued safe operation of nuclear power plants as they age and for renewal of reactor operating licenses beyond their expiration date.

Research is also continuing to assess the performance of reactor safety systems and containments, and resolve technical uncertainties related to severe accident phenomena in order to permit regulatory closure of severe accident issues and review individual plant examinations for severe accident vulnerabilities.

Necessary studies will be conducted to provide the bases to supply technical advice to the states on low-level waste disposal, including research to validate reliability of engineered enhancements for shallow land burial.

Nuclear Material and Low-Level Waste Safety and Safeguards Regulation

NRC regulates a wide variety of nuclear materials licensees across the United States. For instance, there are some 24,000 licensed medical, academic, and industrial users of nuclear materials subject to regulation. Of these, approximately 8,000 are licensed directly by the NRC and about 16,000 are regulated by the 29 states that participate in the NRC Agreement States Program. The NRC's Agreement States assume regulatory responsibility for certain types of nuclear materials. The NRC periodically reviews the Agreement States' radiation control programs and provides the Agreement State personnel NRC-sponsored training opportunities to improve their ability to maintain high quality regulatory programs. In addition, the NRC provides technical assistance with regard to licensing, inspection, enforcement, and regulation development.

Nuclear materials are used in large industrial operations such as the manufacturing of reactor fuel and the production of medical radiopharmaceuticals, fabrication of consumer products such as smoke detectors, and smaller individual operations such as those using small quantities of radioisotopes in medical diagnosis and treatment.

Given the large and varied use of nuclear materials throughout this country, the overall safety record has been very good. However, the Commission will continue to increase the emphasis on improving licensee performance, particularly that of fuel cycle facilities, radiographers, and medical use licensees, since the average citizen is most likely to come in contact with nuclear materials through the medical and industrial applications of such materials.

With regard to fuel facilities, the NRC will be reviewing an application to construct and operate the nation's first privately owned uranium enrichment facility. The application is expected to be submitted in fiscal year 1991 by Louisiana Energy Services. The NRC will need to assess and adjust its licensing procedures to efficiently accommodate this first-of-a-kind application.

The NRC will continue to place significant emphasis on implementing its responsibilities under the Low-Level Radioactive Waste Policy Amendments Act. This includes providing siting and design technical assistance to compact-affiliated and independent Agreement States as they proceed to develop and implement plans to construct low-level waste disposal facilities to meet the January 1, 1993 deadline to arrange for the disposal of their low-level waste. The first application to the NRC for such a disposal facility is expected in 1991.

During fiscal year 1991, the NRC will continue to develop the necessary regulatory framework for decommissioning commercial nuclear facilities and to compel cleanup actions at contaminated sites. The development activities include preparation of interim residual radioactivity criteria for decontaminating licensed facilities. In addition, the NRC will continue its efforts in reviewing and inspecting reactor decommissioning activities.

High-Level Nuclear Waste Regulation

The Nuclear Waste Policy Act, as amended, specifies a detailed approach for the long-range undertaking of high-level waste disposal, with the Department of Energy having operational responsibility and the NRC having regulatory responsibility for the transportation, storage, and geologic disposal of the waste. The disposal of high-level radioactive waste requires a high certainty of acceptable health and environmental impacts over thousands of years.

During fiscal year 1991, NRC will continue to implement its responsibilities under the Nuclear Waste Policy Act, as amended. The near-term impacts of the Department of Energy's recent high-level waste management program delays on the NRC's high-level waste management activities have been assessed and reductions in our high-level waste program are reflected in this budget request. Longer-term modifications to our high-level waste activities and resource levels for fiscal year 1992 and beyond will be made after the Department of Energy develops detailed implementation plans and will be reflected in future NRC budget requests.

CONCLUSION

The NRC is committed to continue meeting our safety mandate under applicable Federal statutes. We believe that our fiscal year 1991 budget is a responsible request for the resources needed to provide credible safety regulation of commercial nuclear power, civilian use of nuclear materials, and management and disposal of nuclear waste.

However, our regulatory responsibilities go beyond ensuring the safety of existing operating facilities. The NRC must prepare to meet the licensing challenges of the 1990s. We must have the resources to deal with new regulatory initiatives that are already on the horizon. License renewal for existing reactors, and review and certification of advanced standardized reactor designs are two of these issues that must be dealt with promptly and efficiently.

The modest funding increases we have asked for are absolutely necessary if the NRC is to continue to provide effective regulation and safety oversight of existing activities and to meet future initiatives. The Congress' continued support for the NRC's programs and resources is essential to the success of the regulatory program.

We urge you to appropriate the full amount of our request.

APPENDIX

BUDGET RESOURCE SUMMARY[1/]

Programs	FY 1990		FY 1991	
	FTE	$	FTE	$
Reactor Safety and Safeguards Regulation	1,485	$ 175.6	1,503	$ 185.8
Nuclear Safety Research	228	103.8	230	111.4
Nuclear Material and Low-Level Waste Safety and Safeguards Regulation	352	42.9	368	45.8
High-Level Nuclear Waste Regulation	83	21.9	79	19.6
Special and Independent Reviews, Investigations, and Enforcement	264	34.8	264	36.1
Nuclear Safety Management and Support	757	69.7	764	72.6
Inspector General	26	2.9	32	3.7
TOTAL	3,195	$ 451.6	3,240	$ 475.0

[1/] Dollars are expressed in millions.

STATEMENT
SUBMITTED BY

THE OFFICE OF THE INSPECTOR GENERAL
THE UNITED STATES NUCLEAR REGULATORY COMMISSION

TO THE

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
COMMITTEE ON APPROPRIATIONS
UNITED STATES HOUSE OF REPRESENTATIVES

CONCERNING
THE FY 1991 BUDGET
FOR THE
OFFICE OF THE INSPECTOR GENERAL

SUBMITTED: March 21, 1990

U.S. NUCLEAR REGULATORY COMMISSION

FY 1991 BUDGET TESTIMONY

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE, THE INSPECTOR GENERAL IS PLEASED TO SUBMIT HIS FISCAL YEAR 1991 BUDGET REQUEST.

AS YOU KNOW, THE INSPECTOR GENERAL ACT AMENDMENTS OF 1988 CREATED A STATUTORY INSPECTOR GENERAL AT THE NRC, EFFECTIVE APRIL 15, 1989. THE NEW OFFICE OF THE INSPECTOR GENERAL SUPPLANTED THE FORMER NRC OFFICE OF INSPECTOR AND AUDITOR, WHICH HAD BEEN RESPONSIBLE FOR CONDUCTING THE AGENCY'S INTERNAL AUDIT AND INVESTIGATIVE PROGRAMS. A COPY OF THE SEMI-ANNUAL REPORT SUMMARIZING OIG ACCOMPLISHMENTS FOR ITS FIRST SIX MONTHS OF OPERATION WAS PROVIDED TO YOU LAST NOVEMBER.

FOLLOWING SENATE CONFIRMATION, THE NRC'S FIRST INSPECTOR GENERAL ASSUMED HIS DUTIES ON DECEMBER 3. HIS FEDERAL CAREER SPANS 15 YEARS OF EXPERIENCE INCLUDING ASSIGNMENTS WITH THE U.S. SECRET SERVICE, THE OFFICE OF LABOR RACKETEERING, THE PRESIDENT'S COMMISSION ON ORGANIZED CRIME AND MOST RECENTLY GAO'S OFFICE OF SPECIAL INVESTIGATIONS.

SIGNIFICANT PROGRESS HAS BEEN MADE IN THE PAST TWO MONTHS IN FILLING KEY STAFF POSITIONS IN THE INVESTIGATIVE AREA. AN ASSISTANT INSPECTOR GENERAL FOR INVESTIGATIONS AND SIX SENIOR SPECIAL AGENTS HAVE BEEN HIRED. ALL HAVE SUBSTANTIAL INVESTIGATIVE EXPERIENCE AND ARE WELL RESPECTED WITHIN THE

FEDERAL COMMUNITY. ALSO, WE HAVE BEEN ABLE TO REDUCE THE EXISTING INVESTIGATIVE CASE BACKLOG BY 25% DURING THIS PERIOD. BY REDUCING THE CASELOAD, THE INVESTIGATIVE STAFF CAN BE MORE PRO-ACTIVE AND CONCENTRATE ON THE MOST SIGNIFICANT AGENCY MATTERS WHICH REQUIRE THE OIG'S ATTENTION. ADDITIONALLY, A HOTLINE PROGRAM WILL SOON BE OPERATING TO RECEIVE AND INVESTIGATE ALLEGATIONS OF WRONGDOING BY NRC EMPLOYEES AND CONTRACTORS.

ONE OF THE PRINCIPAL CONCERNS OF CONGRESS THAT LED TO THE CREATION OF THE NRC'S INSPECTOR GENERAL WAS THAT CONGRESS AND THE AMERICAN PUBLIC NEEDED RELIABLE AND INDEPENDENT ASSURANCE OF THE INTEGRITY AND EFFECTIVENESS OF THE NRC'S CRITICALLY IMPORTANT LICENSING AND INSPECTION PROGRAMS.

TO ADDRESS THIS CONCERN, AN INSPECTION STAFF HAS BEEN ESTABLISHED AS AN ADJUNCT TO THE IGs AUDIT AND INVESTIGATIVE STAFFS. THE INSPECTION STAFF WILL CONDUCT BROADBASED INQUIRIES AND REVIEWS OF THE NRC'S OPERATIONS CAPABILITY. IN ADDITION THE INSPECTION STAFF WILL DEVELOP A CAPABILITY FOR RAPID FACT FINDING MISSIONS IN RESPONSE TO URGENT NEEDS AND ONGOING EVENTS.

THE STAFF WILL BE MADE UP OF SENIOR PERSONNEL FROM A VARIETY OF BACKGROUNDS WHO POSSESS ADVANCED FACT FINDING SKILLS AND MATURE JUDGEMENT. THIS SECTION WILL REPORT THEIR RESULTS IN THE

FORMAT OF INVESTIGATIONS, AUDITS OR STUDIES. THE TYPE OF REPORT WILL BE DICTATED BY THE FINDING.

WHILE SUBSTANTIAL PROGRESS HAS BEEN MADE TOWARD ESTABLISHING PROGRAMS TO ACCOMPLISH OUR LEGISLATIVE RESPONSIBILITIES, A NUMBER OF INITIATIVES STILL REMAIN. TO ACCOMPLISH THIS, THE OIG WILL REQUIRE INCREASED RESOURCES IN FISCAL YEAR 1991.

THE OIG FISCAL YEAR 1991 BUDGET REQUEST IS FOR $3.7 MILLION. THIS IS AN INCREASE OF $800,000 ABOVE FISCAL YEAR 1990.

THE INCREASE IS NEEDED TO STAFF THE IGs HOTLINE, INSPECTION TEAM, AND CONTRACT AUDIT CAPABILITY. THE CONTRACT AUDIT CAPABILITY WILL BE NEW TO THE NRC AND IS NEEDED TO MEET THE REQUIREMENTS OF THE IG ACT AND OMB DIRECTIVES. IN FISCAL YEAR 1991, THE AGENCY HAS REQUESTED $159 MILLION IN PROGRAM SUPPORT FUNDS. ALMOST ALL OF THESE FUNDS WILL BE OBLIGATED FOR CONTRACTS WITH THE PRIVATE SECTOR AND INTERAGENCY AGREEMENTS. CURRENTLY, THE OIG DOES NOT HAVE ADEQUATE STAFF EXPERTISE TO PROVIDE AUDIT COVERAGE FOR THIS IMPORTANT AREA. ONE OF THE OFFICE'S MAJOR INITIATIVES WILL BE TO ENSURE THAT THE NRC CONTRACTS PROGRAM DOES NOT FALL VICTIM TO THE WASTE, FRAUD AND ABUSES THAT HAVE BEEN WIDELY PUBLICIZED IN OTHER GOVERNMENT PROGRAMS IN RECENT YEARS.

PROVIDING THE FULL AMOUNT OF THIS REQUEST WILL ALLOW THE INSPECTOR GENERAL TO TAKE THE NECESSARY STEPS TO ESTABLISH STRONG AUDIT, INSPECTION AND INVESTIGATIVE PROGRAMS AT THE NRC.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
Office of Governmental and Public Affairs
Washington, D.C. 20555

KENNETH M. CARR

Kenneth M. Carr became Chairman of the Nuclear Regulatory Commission on July 1, 1989. He has been a member of the Commission since August 14, 1986. He retired from the U.S. Navy as a vice admiral on May 1, 1985, last serving as Deputy and Chief of Staff to the Commander in Chief Atlantic Command and the Commander in Chief of the U.S. Atlantic Fleet.

Mr. Carr enlisted in the Navy in 1943 and served as a crewman on an assault landing craft in the Pacific theater before being selected for an officer candidate program at the University of Louisville in 1944, and being appointed to the U.S. Naval Academy as a member of the class of 1949.

In 1950, he entered submarine school in New London, Connecticut, and in 1953 was assigned to the precommissioning detail of the nuclear submarine USS NAUTILUS. With the exception of a one-year period for nuclear power training, he served as a member of the NAUTILUS crew until 1960. He later served as Commanding Officer of the nuclear submarine USS FLASHER and the fleet ballistic missile nuclear submarine USS JOHN ADAMS.

He was assigned to the Office of the Chief of Naval Operations (Research and Development) in 1968, and to the staff of the Commander in Chief of the U.S. Atlantic Fleet in 1970, as a senior member of the Naval Nuclear Propulsion Examining Board. In 1972, Chairman Carr was assigned as Chief of Staff to the Commander, Submarine Force of the U.S. Atlantic Fleet and in 1973, assumed duties of Military Assistant to the Deputy Secretary of Defense.

From June 1977 to May 1980, he commanded the Submarine Force, U.S. Atlantic Fleet. He served as Vice Director of Strategic Target Planning at Offutt Air Force Base, Nebraska, before assuming duties as Deputy and Chief of Staff to the Commander in Chief, U.S. Atlantic Command on April 1, 1983.

Among his honors are the Defense and Navy Distinguished Service Medals, the Legion of Merit, Presidential Unit Commendation and the Defense Superior Service Medals.

Chairman Carr was born in Mayfield, Kentucky, on March 17, 1925, and is married to Molly Pace of Burkesville, Kentucky.

July 1989

UNITED STATES
NUCLEAR REGULATORY COMMISSION
Office of Governmental and Public Affairs
Washington, D.C. 20555

THOMAS MORGAN ROBERTS

Thomas Morgan Roberts was sworn in for a second term as a member of the Nuclear Regulatory Commission on July 12, 1985; the term will expire on June 30, 1990. He was sworn in as a first-term member of the Commission on August 3, 1981.

Commissioner Roberts has first-hand experience in the manufacture of nuclear power plant components having served as Chief Executive Officer and President of the Southern Boiler and Tank Works, Inc., of Memphis, Tennessee, from 1969 to 1978. His experience in nuclear-component manufacturing required daily contact with relevant codes, standards and regulations from the time he first joined the company in 1962.

Mr. Roberts also has been an underwriting member of Lloyd's of London and a director of Boyle Investment Company.

He received his B.S. degree in Industrial Engineering from the Georgia Institute of Technology in 1959 and, subsequently, was commissioned an ensign in the U.S. Navy. He served as engineering officer during his three years aboard a Navy destroyer.

Mr. Roberts has been active in civic and cultural affairs having served as a member of the Employee Benefits Committee of the National Association of Manufacturers and was formerly President of the Memphis Symphony. He was formerly a Vice President and member of the Executive Committee of the Washington Opera.

Mr. Roberts and his wife are residents of Memphis, Tennessee, but currently reside in Chevy Chase, Maryland. They have three children.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
Office of Governmental and Public Affairs
Washington, D.C. 20555

KENNETH C. ROGERS

Kenneth C. Rogers was sworn in for a five-year term as a member of the Nuclear Regulatory Commission on August 7, 1987. Before his nomination by President Reagan and confirmation by the Senate, Dr. Rogers served as president of Stevens Institute of Technology for 15 years.

He joined Stevens in 1957 following research appointments at Cornell University. At Stevens he served the college as a professor, head of the physics department, dean of the faculty and acting provost before becoming its president in 1972.

A physicist by training, Dr. Rogers' technical areas of expertise include plasma physics, particle accelerators, optical spectroscopy and elementary particle physics. He is the author of more than 30 technical papers.

Dr. Rogers is a member of the New Jersey Commission on Science and Technology and numerous professional societies, including the American Physical Society and the Institute of Electrical and Electronics Engineers. He is a Fellow of the American Association for the Advancement of Science.

He has served as a director of the Public Service Enterprise Group (formerly Public Service Electric and Gas Company of New Jersey). In addition, he has been a trustee of the Christ Hospital, Jersey City, NJ; the Association of Independent Colleges and Universities in New Jersey; the Independent College Fund of New Jersey; and the Hoboken (NJ) Chamber Orchestra.

He received a bachelor of science degree in physics from St. Lawrence University (1950) and a master of arts degree in physics (1952) and doctor of philosophy degree in physics (1956) from Columbia University. He was awarded an honorary doctorate degree by St. Lawrence University in 1983 and by Stevens Institute of Technology in 1987.

Born in Teaneck, New Jersey, Dr. Rogers and his wife Katherine have three children.

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JAMES R. CURTISS

James R. Curtiss was sworn in as a member of the Nuclear Regulatory Commission on October 20, 1988 to serve a term ending June 30, 1993.

Before his nomination by President Reagan and confirmation by the Senate, Mr. Curtiss served as Associate Counsel for the Senate Committee on Environment and Public Works. He joined the staff of the Committee in early 1981 as an Assistant Counsel.

Previously, he started his law career with the Nuclear Regulatory Commission, serving from 1979-1981--first as an attorney with the Office of Executive Legal Director and later as a member of then-NRC Commissioner Richard T. Kennedy's staff.

Mr. Curtiss was graduated from the University of Nebraska in 1976 with a bachelor of arts degree and received his law degree there in 1979.

He was born December 20, 1953 in Lincoln, Nebraska. He and his wife live in Silver Spring, Maryland. They have one child.

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DR. FORREST J. REMICK

Dr. Forrest J. Remick was sworn in for a five-year term as a member of the Nuclear Regulatory Commission on December 1, 1989.

At the time of his nomination to the Commission by President Bush, Dr. Remick was Associate Vice President for Research and professor of Nuclear Engineering at the Pennsylvania State University. He also was serving as Chairman of the NRC's independent Advisory Committee on Reactor Safeguards (ACRS).

Beginning in 1967, Dr. Remick held a variety of positions of increasing responsibility at Penn State, including Director of the Institute for Science and Engineering, Director of Intercollege Research Programs, Director of the Curtiss-Wright Nuclear Research Laboratory and Coordinator of University Energy Programs.

Dr. Remick was appointed to the ACRS in September 1982 and was reappointed in September 1986. He was elected Vice-Chairman for 1987 and 1988 and as Chairman for 1989.

He has served in a number of other capacities in the nuclear energy field, including Chief of the Training Section, Department of Technical Assistance, International Atomic Energy Agency, Vienna, Austria; Administrative Judge with the NRC's Atomic Safety and Licensing Board; Member of the Governor's Energy Council of the Commonwealth of Pennsylvania; Director of the NRC Office of Policy Evaluation; Member of the National Nuclear Accrediting Board; as well as serving on various scientific and nuclear safety advisory committees for the Argonne, Hanford, Idaho and Savannah River Laboratories of the Department of Energy.

He received his Ph.D. (1963), M.S. (1958), and B.S. (1955) in Mechanical Engineering from Penn State. He also was graduated from the Oak Ridge (Tennessee) School of Reactor Technology.

He was born March 16, 1931.

Dr. Remick and his wife have two children.

#

December 1989

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JAMES M. TAYLOR

James M. Taylor was named Executive Director for Operations of the Nuclear Regulatory Commission in December 1989. The Executive Director for Operations is the chief staff official of the NRC, managing day-to-day operations of the agency and reporting directly to the Commission.

Mr. Taylor was named Deputy Executive Director for Nuclear Reactor Regulation, Regional Operations and Research in January 1989. Since April 1987, he had served as Deputy Executive Director for Regional Operations and Acting Deputy Executive Director for Operations.

He joined the NRC in May 1980 and since then has served in positions of increasing responsibility, becoming Deputy Director of the Office of Inspection and Enforcement in October 1983 and Director of that Office in January 1985.

In 1989, he received the Distinguished Senior Executive award, the highest award of the Federal Government's Senior Executive Service.

Immediately prior to joining the NRC staff, he served in the Office of Naval Reactors as Associate Director of the Department of Energy's High Speed Submarine Projects, after earlier serving 20 years as an engineering duty officer in the U.S. Navy Nuclear Power Program.

Mr. Taylor is a 1956 graduate of the U.S. Naval Academy where he earned a Bachelor of Science degree. In 1961, he earned a Master of Science and Engineer's degree from the Massachusetts Institute of Technology.

#

February 1990

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DR. THOMAS E. MURLEY

Dr. Thomas E. Murley became Director of the Office of Nuclear Reactor Regulation in April 1987. His office is responsible for licensing and inspection activities associated with the construction and operation of nuclear power plant, research and test reactors and for licensing reactor operators.

Previously he had been Administrator of the Region I Office in King of Prussia, Pennsylvania, a position he assumed in June 1983.

Earlier, Dr. Murley served as Director of the NRC's Regional Operations and Generic Requirements Staff in Bethesda, Maryland; Director of the Division of Safety Technology in the Office of Nuclear Reactor Regulation; and Director of the Division of Reactor Safety Research in the Office of Nuclear Regulatory Research.

Dr. Murley joined the former Atomic Energy Commission's Division of Reactor Development and Technology in 1968 after serving as Senior Scientist with the Westinghouse Advanced Reactor Division. During the period from 1972 to January 1974, he served as Technical Assistant to AEC Commissioner William O. Doub.

He subsequently served as Assistant Director of the Clinch River breeder reactor program for the former Energy Research and Development Administration before joining the NRC in 1975.

Dr. Murley received a B.S. degree in engineering mechanics from the University of Illinois in 1961 and a Sc.D. degree in nuclear engineering from Massachusetts Institute of Technology in 1965. After graduation from MIT, he was appointed as a NATO Postdoctoral Fellow at the Karlsruhe Nuclear Research Center in West Germany.

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ROBERT M. BERNERO

In February 1989 he became Director, Office of Nuclear Material Safety and Safeguards (NMSS) at the Nuclear Regulatory Commission (NRC). NMSS is responsible for licensing, inspection, and environmental reviews of all activities regulated by the NRC except reactors. This includes uranium recovery; fuel fabrication and development; industrial, medical, academic and commercial uses of radioisotopes; safeguards activities; transportation of nuclear materials; and radioactive waste storage and disposal. He had served as Deputy Director of NMSS for two years.

From November 1985 until April 1987 he was the Director, Division of Boiling Water Reactors Licensing, in the Office of Nuclear Reactor Regulation (NRR) at NRC. In this position he has directed the technical review of U.S. boiling water reactors in matters of licensing and systems. From mid-1984 he served as the Director, Division of Systems Integration, in NRR at NRC. In this position he directed technical review of U.S. reactors in matters of systems and radiological safety.

Between 1979 and 1984 he served in the NRC's Office of Research as the Director of Research in Probabilistic Risk Analysis and Accident Releases or Source Terms. During 1979 he was deeply involved in the response to and the investigation of the Three Mile Island accident.

From 1977 to 1979 he was Assistant Director for Material Safety Standards, developing policies and standards for nuclear material safety including decommissioning and waste disposal. From 1975 to 1977 he served in NMSS as a licensing manager and Chief of the Fuel Reprocessing and Recycle Branch. From 1972 to 1975 he was a manager of nuclear licensing for a number of light water reactors and a fast breeder reactor.

Before joining the Atomic Energy Commission (later the NRC) in early 1972, he spent 13 years with the General Electric Company in nuclear work. From 1966 to 1972 he performed and managed work on reactors and radioisotope power devices for space applications including the design and construction of the isotope power supply for the U.S. Voyager mission to the outer planets. From 1959 to 1966 he worked as a design construction and test engineer for the nuclear power plants used in U.S. Navy surface ships.

He holds a Bachelor of Arts degree from St. Mary of the Lake in Illinois, a Bachelor of Chemical Engineering degree from the University of Illinois, and a Master of Chemical Engineering degree from Rensselaer Polytechnic Institute.

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ERIC S. BECKJORD

Mr. Eric S. Beckjord was appointed Director, Office of Nuclear Regulatory Research in September 1986.

Mr. Beckjord has broad experience in engineering disciplines related to nuclear energy. He began his professional career with the General Electric Company in 1956 as a Development Engineer for G.E. Boiling Water Reactor plants. He has held several managerial positions both domestic and abroad in nuclear energy systems with Westinghouse Electric Corporation (1963-1975). Other positions Mr. Beckjord has held include Associate Director for Policy Evaluation with the Federal Energy Administration (1975-1976); and Director, Division of Reactor Development and Demonstration with the Energy Research and Development Administration (1976-1977). He was Director, Division of Nuclear Power Development with the Department of Energy (1977-1978) and U.S. Coordinator for the International Nuclear Fuel Cycle Evaluation, Departments of Energy and State (1978-1980). From 1980-1984 he served as Deputy Director for Science and Technology at the Argonne National Laboratory, and in 1984 was invited to be a Visiting Professor in the Nuclear Engineering Department of the Massachusetts Institute of Technology (MIT).

Mr. Beckjord received an A.B. degree from Harvard College and earned his Masters degree in electrical engineering from MIT. He also holds an M.B.A. degree from the University of Chicago.

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EDWARD L. JORDAN

Mr. Jordan is a graduate in physics and mathematics from Northwestern State University of Louisiana with graduate studies in nuclear engineering at Southern Methodist University and Texas Christian University.

Mr. Jordan first joined the Atomic Energy Commission in 1969 as a Reactor Inspector in the Region III office in Chicago. Since that time he has held positions of increasing responsibility in inspection, enforcement, engineering, events evaluation and quality assurance. Preceding his joining the Nuclear Regulatory Commission, Mr. Jordan's experience was in reactor design, operations and testing at the General Dynamics Nuclear Aerospace Research facility at Fort Worth, Texas. Mr. Jordan has a total of 33 years of nuclear reactor experience.

Mr. Jordan is currently the Office Director in the Office for Analysis and Evaluation of Operational Data, U. S. Nuclear Regulatory Commission, Washington, D. C. Mr. Jordan's current responsibilities include management of the NRC prompt response to events and incidents, analysis and evaluation of operational safety data associated with NRC licensed activities, management and direction of the agency program for reactor performance indicators, management and direction of the agency program for diagnostic evaluations and investigation of significant operational events, and provision of appropriate technical training for NRC staff. Mr. Jordan is the Chairman of the Committee to Review Generic Requirements.

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RONALD M. SCROGGINS

Mr. Ronald M. Scroggins joined the former Atomic Energy Commission in March 1960 as a Chemical Engineer in the Division of Reactor Development. Since then, he has held progressively responsible positions at the AEC/NRC, including Chief, Systems Engineering Branch, Division of Reactor Safety Research. In August 1978, he was appointed Director, Administration and Resource Control Staff, Office of Nuclear Regulatory Research.

In February 1982, Mr. Scroggins was appointed Deputy Controller and Deputy Director, Office of Resource Management. Mr. Scroggins has served as the Controller of the Nuclear Regulatory Commission since July 1985.

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PATRICIA GOODWIN NORRY

Ms. Patricia G. Norry was appointed Director, Office of Administration in February 1989. She previously had served since April 1987 as Deputy Director for Administration, Office of Administration and Resources Management. Ms. Norry was first appointed as Director, Office of Administration in July 1982 and in 1978 as Deputy Director, Office of Administration. Ms. Norry was a member of the NRC's Special Inquiry Group on the Three Mile Island accident in 1979. Prior to this she served as Special Assistant to the Director, Office of Nuclear Regulatory Research from 1975 to 1978.

Ms. Norry joined the former Atomic Energy Commission in 1961 as Staff Assistant to then Chairman Glenn T. Seaborg (1961-1968). From 1969 to 1972, Ms. Norry held the position of Environmental Analyst, and from 1972 to 1975, as Special Assistant to the Director, Division of Reactor Safety Research.

Ms. Norry received a B.A. degree in psychology from Seton Hill College and performed graduate study in clinical psychology at the George Washington University. She completed a one-year fellowship for graduate study in public administration at Stanford University. Ms. Norry has also completed senior management and executive leadership training programs offered by Harvard University and the Federal Executive Institute.

In 1984 Ms. Norry received the Presidential Meritorious Rank Award. Other awards include a Sustained Superior Performance Award in 1972, a Special Achievement Award in 1976, Senior Executive Service Bonus Awards in 1982, 1983, 1985, 1986, 1987 and 1988. She also received the 1968-1969 National Institute of Public Affairs Career Education Award from Stanford University.

Ms. Norry has served since 1986 as a member on the Executive Development Committee of the NRC's Executive Resource Board, and the Small Agency Council Executive Board. From 1982 to 1986, she was chairperson of the NRC's Performance Review Board. Since 1988 she has served on the SES Advisory Panel, Office of Personnel Management Executive Potential Program.

Included amoung her volunteer activities are Chairperson of the Board of Directors, Energy Federal Credit Union (NRC and DOE) since 1980, and is currently a member of the Board of Directors, Hamlet Citizens Association.

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WILLIAM C. PARLER

On July 1, 1986, William C. Parler became General Counsel of the Nuclear Regulatory Commission.

Mr. Parler is a graduate of the U.S. Naval Academy in 1951. He served in the U.S. Navy from 1951-1955, and earned law degrees from the University of South Carolina in 1958 and from Harvard University in 1959.
Mr. Parler's service in the legal aspects of the nation's nuclear program began in 1959 with the former Atomic Energy Commission. Among the positions he has held are Committee Counsel to the former Joint Congressional Committee on Atomic Energy, 1971-1972 and 1975-1976; a member of the Atomic Safety and Licensing Appeal Board Panel, 1972-1974; Senior Attorney in the Office of the NRC's Executive Legal Director, 1977-1981; a Group Leader in NRC's Special Inquiry Group on the Three Mile Island accident in 1979; and Legislative Counsel in the Office of the General Counsel of the NRC in 1982.

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DAVID C. WILLIAMS

David C. Williams became the first Inspector General of the Nuclear Regulatory Commission on November 22, 1989. The position was established by Congress in early 1989.

The duties of Inspector General include supervising and coordinating audits and investigations of all NRC programs and operations and keeping the NRC Chairman and Congress fully informed of fraud, abuses and deficiencies relating to the administration of those programs and operations.

Mr. Williams, nominated by President Bush, had been Director of the Office of Special Investigations at the General Accounting Office since 1986.

Previously, Mr. Williams was Director of Operations in the Office of Labor Racketeering at the Department of Labor, 1984-86; Supervisory Staff Investigator for the President's Commission on Organized Crime, 1983-84; Special Agent-in-Charge, Office of Labor Racketeering, Department of Labor, in New York and Cleveland, Ohio and Supervisory Special Agent in Chicago, 1979-84; Special Agent for the U.S. Secret Service In Chicago, 1975-79.

He was graduated in 1971 from Southern Illinois University with a Bachelor of Science degree. He received a Master's degree in Education in 1973 and an advanced degree in Education in 1975 from the University of Illinois.

Born January 7, 1947, Mr. Williams resides in Alexandria, VA.

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